CHAPTER 3

THE AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing natural and human environment that would potentially be affected by the Proposed Action and its alternatives. For purposes of analysis, the discussion focuses on two geographic areas: the project area and the offered lands. The term "project area" used throughout this document refers to an approximately 36,675-acre area (depicted in Figure 1-2) that encompasses lands involved in both the MPO and the exchange. The project area includes BLM-administered lands on which the proposed mine plan would occur; additional BLM administered lands selected by PD for the proposed land exchange; PD-owned private lands; and a non-PD-owned private inholding. The second geographic focus of this analysis, the offered lands, are PD-owned properties scattered among several locations throughout southern and central Arizona that are being offered by PD in exchange for the selected public lands in the project area.

The description of the project area begins with a regional overview, then proceeds with a more detailed treatment organized into six major resource categories: Land Use, Physical Resources, Biological Resources, Cultural Resources, Socioeconomic Resources, and Indian Trust Resources. For some resources, baseline data were collected within study areas. The location and extent of these study areas vary depending on the type of data being collected. The offered lands included in the land exchange alternative are described at the end of the chapter. They are grouped into either the base package of offered lands or the optional package of offered lands (see the Land Exchange Alternative Set in Chapter 2 for an explanation of these packages). Within these two divisions, each offered property is described according to the first five major resource categories listed above. The existing conditions of resources on the three optional properties that were not included in the land exchange alternative (Davison, Lehner Ranch, and Lincoln Ranch properties) are described in Appendix E.

3.2 PROJECT AREA

The approximately 36,675-acre project area[1] lies within the Safford Valley on the south-facing slope of the Gila Mountains, about seven to eight miles[2] north of the Gila River near the City of Safford, in Graham County, Arizona (see Figure 1-1 in Chapter 1). Safford is the county seat and serves as a regional service center for much of southeastern Arizona and parts of southwestern New Mexico. Its economy is mainly supported by retail, government, and agriculture (ESI 1997). Graham County's median household income ranks among the lowest in the State. The county is sparsely populated, with a large percentage of Native American and Hispanic residents. Most of the Native Americans live on the San Carlos Apache Reservation, which covers approximately the northern third of the county and lies in close proximity to the project area (see Figure 1-1).

[1] The size of the project area (or study area) varies somewhat depending on the resource being analyzed. This and many other acreage figures provided in this document are approximate based on data retrieved through Computer-Aided Drafting (CAD) software. Table totals may not add up due to rounding error.

[2] As measured from the center of the Dos Pobres and San Juan pits to the north bank of the Gila River at the Safford (Eighth Avenue) Bridge.

The climate in the region is semi-arid, hot in the summer and moderate in the winter. Mean annual precipitation in Safford is 9.8 inches per year (Dames & Moore 1996a), with about half of the precipitation falling during summer thunderstorms and the remainder occurring as intermittent winter or spring storms (Sellers and Hill 1974). Prevailing daytime winds are generally from the northwest, blowing up the Safford Valley (Class One Technical Services 1997).

Figure 3-1 shows the topography and some of the major drainages of the project area. Elevations range from about 3,040 to 5,400 feet above mean sea level. Dominant landforms range from nearly level and gently sloping alluvial and colluvial terraces in the southern part of the project area to steep, rocky slopes in the northern part. The ground surface is generally rough, broken, covered by gravel and cobbles, and sparsely vegetated. Over much of the project area, the dominant plant association is the creosote-bursage association of the Sonoran Desertscrub biotic community (SWCA 1997a). Several large, ephemeral washes, including Peterson, Cottonwood, Talley, and Watson Washes, drain the area from roughly the northeast to the southwest, eventually flowing into the Gila River (Figure 3-1).

The project area is part of the Safford Mining District, an area containing several known copper mineral deposits, including the Dos Pobres, San Juan, Lone Star, and Sanchez deposits (see Figure 1-1). These deposits generally are located along a northwest-southeast alignment governed by regional structural geology. Portions of the Mining District have been mined intermittently since the late 1800s, mostly by small operators. Phelps Dodge Corporation entered the Safford Mining District in 1957 when it acquired existing mining claims north of Safford and discovered the Dos Pobres copper deposit the following year (PDSI 1996). Exploration progressed at Dos Pobres, and construction began in 1968 on underground workings to mine the deep sulfide orebody. Operations ceased in 1982 when declining copper prices resulted in unfavorable economics for the underground operation (ibid.). Interest in the Dos Pobres property was renewed in 1991 when additional exploration identified a leachable, primarily oxide, copper resource above the deeper sulfide portions of the deposit.

The San Juan deposit, located less than two miles to the southeast of Dos Pobres, was known long before PD's arrival in the Mining District. It was mined for a short period at the turn of the century following the discovery of chalcocite copper veins. Mining resumed there in the late 1960s-early 1970s, with ore from the small open pit being processed to produce copper precipitate (ibid.). Phelps Dodge acquired the San Juan mine property in 1994 from a consortium of private owners.

The Lone Star orebody, located southeast of the San Juan property, was discovered in 1955 by Kennecott Copper Corporation (ibid.). Kennecott conducted exploratory and assessment work at Lone Star from 1958 until the mid-1980s, including construction of an 800-foot shaft and underground workings to obtain bulk ore samples. Phelps Dodge purchased the Lone Star property from Kennecott in 1987.

The Sanchez copper deposit at the southeastern end of the Mining District has been evaluated for possible development by several mining companies over the years, most recently by AZCO Mining Inc. In 1993, AZCO received several environmental permits to develop the leachable copper deposit, including BLM approval of the Sanchez Copper Project's Plan of Operations (see USDI BLM 1992b). Phelps Dodge purchased rights to the approved Sanchez Copper Project in 1995.

3.2.1 Land Use

3.2.1.1 Public Lands Management

As a public lands management agency, BLM is responsible for the balanced management of public lands and resources and their various values so that they are maintained in a combination that best serves the needs of the American people. Such values include, but are not limited to, recreational, range, timber, mineral, watershed, fish and wildlife, wilderness and natural, scenic, scientific, and cultural values.

Since 1981, BLM has been responsible under regulations at 43 CFR 3809 for administering MPOs and Mining Notices filed for BLM-administered public lands. The Safford Field Office of the BLM currently administers six MPOs and 22 Mining Notices that have been submitted and authorized. BLM administration of mining plans and notices entails reviewing the plan or notice for completeness; preparing appropriate NEPA documents; authorizing reclamation plans and ensuring that the operator has secured the required reclamation bonds; advising the operator of any permits required by other agencies; conducting periodic inspections during operations for compliance with permit conditions; and inspecting reclamation efforts for consistency with the reclamation plan after closure. The reclaimed federal lands then return to the public domain and are managed for the post-mining land uses proposed in the reclamation plan.

In addition to following the general management prescriptions of the Safford District RMP, as amended (USDI BLM 1991, 1994b), BLM's other primary responsibilities in the project area include administering grazing allotments; maintaining existing public and physical access to public lands for recreation and other public uses; and negotiating rights-of-way, easements, and other realty actions allowed by the RMP (USDI BLM 1991).

3.2.1.1.1 Land Ownership. The land ownership pattern in the project area and surrounding environs is depicted in Figure 1-2 in Chapter 1. Table 3-1 summarizes the acres of land administered by the BLM and belonging to PD and non-PD private entities that would be affected by mining activities as proposed in the MPO, and the acres of similarly owned land in the project area. Since the DEIS was issued, PD has acquired a 320-acre parcel of state land on the north of the project area side (south half of Section 21, see Figure 1-2). Lands in the project area that will be avoided by the proposed Project consist of the patented (i.e., privately owned) Horseshoe Claims, which are owned by several private parties other than PD and located in portions of Sections 8 and 17, and the Melody Claims, which are federal lands encumbered by third-party mining claims located in portions of Sections 11 and 14 (see Figure 1-2).

Table 3-1. Land Ownership Acreage Summary for the MPO and the Project Area

	BLM-administered (Selected Lands)	Phelps Dodge	Other	TOTAL
MPO	1,931	1,429	0	3,360
Project Area	16,297	19,640	738*	36,675

* Includes the 628-acre Melody Claims (on BLM land) and the 110-acre Horseshoe Claims (privately owned).

Land ownership patterns and encumbrances such as rights-of-way and easements affect the management of public lands, as do parcel configuration factors, such as the number, size, and shape of parcels in a given area. The number of parcel "corners" shared with other landowners can be used as a rough index of management difficulty. In general, the more corners shared with other landowners, the more complex the management responsibilities. In the project area depicted in Figure 1-2, the BLM manages three federal land parcels bordered by approximately 78 miles of boundary lines. Currently, the BLM shares 116 corners with PD, and seven corners with non-PD private land owners (i.e., Horseshoe property) within the project area.

3.2.1.1.2 Special Management Areas. Special Management Areas are congressionally or administratively designated geographic areas within a BLM field office requiring explicit management to achieve BLM's special objectives. In the Safford Field Office, such areas include Wildernesses; Areas of Critical Environmental Concern (ACECs); and National Conservation Areas (NCAs, including the subgroup designated Riparian National Conservation Areas [RNCAs]). The Safford Field Office is responsible for managing public lands within six wildernesses and one wilderness study area totaling 78,560 acres, eleven ACECs totaling about 28,788 acres, and one RNCA totaling 21,767 acres (as listed in Table 3-2). In addition to these 19 special management areas, four river segments totaling 51.1 miles within the Safford Field Office have been recommended by the BLM and the Department of the Interior for designation as Wild and Scenic Rivers (W&SRs) (see Table 3-2). Although a legislative EIS for all river segments in Arizona considered eligible for W&SR status was completed in 1994, congressional approval of those segments recommended for designation by the BLM is still pending. In the meantime, the recommended segments within the Safford Field Office, including a 0.25-mi-wide corridor on either side of the stream, are being managed by the BLM to protect the identified wild and scenic values. Therefore, the Safford Field Office is responsible for managing a total of 23 special management areas.

For some, but not all, of the Special Management Areas listed above, the BLM has prepared a detailed plan that provides specific management guidance for the resources within that area. These plans may be in the form of an Activity Plan or a Management Plan. Special Management Areas for which some type of plan has been prepared are indicated with an "*" in Table 3-2. BLM manages the Special Management Areas that do not have such plans according to the general management prescriptions approved in the Safford District RMP, as amended.

3.2.1.2 Access and Recreation

3.2.1.2.1 Access. Four primary roads lead to or through the project area: Solomon Pass Road, Lone Star Mountain Road, San Juan Mine Road, and Phelps Dodge Mine Road (a.k.a. PD Mine Road or Dos Pobres Road) (see Figure 1-2) (SWCA 1997e). These roads provide varying degrees of physical access from Airport and Safford-Bryce roads northward toward the Gila Mountains. Lone Star Mountain and Phelps Dodge Mine roads are barred by gates as they enter PD's private lands and provide only limited public access to federal lands and no access to public recreational areas.

Users of Solomon Pass Road and San Juan Mine Road include, but are not limited to, the public for recreation and to reach public recreational areas, ranchers to manage livestock, PD and other mining claimants to reach their property and mining claims, a utility company in operation of a powerline, the BLM in the administration of the public lands, and state agencies. These two roads are linked at their northern ends by West Ranch Road, which runs east-west along the northeastern boundary of the project area (see Figure 1-2). All but the lower three miles of Solomon Pass Road and all of San Juan Mine and West Ranch roads are unpaved and suitable for two- or four-wheel-drive, high-clearance vehicles. Although these are considered ranch roads rather than official county roads, Graham County occasionally maintains them as a courtesy to ranchers. The lower three miles of Solomon Pass Road from its intersection with Airport Road are chip-sealed.

Table 3-2. Special Management Areas within the Safford Field Office

Wilderness	North Santa Teresa Wilderness, Fishhooks Wilderness, Peloncillo Mountains Wilderness*, Dos Cabezas Mountains Wilderness*, Redfield Canyon Wilderness*, Aravaipa Canyon Wilderness*, Baker Canyon Wilderness Study Area
Areas of Critical Environmental Concern (ACEC)	111 Ranch Research Natural Area ACEC, Turkey Creek Riparian ACEC, Table Mountain Research Natural Area ACEC, Desert Grasslands Research Natural Ar ea ACEC, Hot Springs Watershed ACEC*, Bear Springs Badlands ACEC, Willcox Playa National Natural Landmark ACEC, Dos Cabezas Peaks ACEC, Eagle Creek Bat Cave ACEC, Bowie Mountain Scenic ACEC, Guadalupe Canyon Outstanding Natural Area ACEC
Recommended Wild & Scenic Rivers	Gila River (Gila Box)*, Lower San Francisco River, Aravaipa Creek, Bonita Creek*
Riparian National Conservation Area (RNCA)	Gila Box*

* Management plans, either in interim, draft, or final form, have been prepared for or apply to these areas.
Source: BLM 1991, 1994b; S. Knox, BLM.

Solomon Pass Road originates off of Airport Road near the Safford Municipal Airport. This road provides public and physical access to the eastern portion of the project area, to Bonita Creek and the Gila Box Riparian National Conservation Area (RNCA) via Lee Trail, and to the north-facing slopes of the Gila Mountains. San Juan Mine Road provides public and physical access to the Melody Claims; physical access onto the PD's privately held San Juan Mine property; and physical and public access to the Johnny Creek area of the Gila Mountains. PD currently allows access across their property on the San Juan Mine Road to reach areas of public land to the north. Access to the pit area, however, is limited to authorized personnel only. Owners of the patented Horseshoe Claims access their property via a dirt spur road off of Solomon Pass Road. Both Solomon Pass and San Juan Mine Roads join West Ranch Road, which forms the southern segment of the Johnny Creek Loop, a popular recreational drive that leads to public lands in Johnny Creek, a tributary of upper Bonita Creek. West Ranch Road also provides access to the Safford-Morenci trailhead, the starting point of a well-known historical and recreational trail.

3.2.1.2.2 Recreation. Recreational opportunities on the federal lands in the project area are dispersed; no developed recreational sites are present. Recreational use includes backcountry driving, hiking, horseback riding, mountain biking, and hunting. In addition, approximately 1,000 people use Solomon Pass Road each year, approximately half to view wildlife in the Gila Box RNCA and remainder who access Bonita Creek for hiking and backpacking (SWCA 1996e).

The BLM estimates that approximately 2,800 to 3,100 backcountry drivers use the ranch roads in and near the project area each year (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998). Other recreational users of these roads include about 75 horseback riders and roughly 30 mountain bike riders a year. Most people use the Solomon Pass, San Juan Mine, West Ranch, and Johnny Creek Loop Roads, but a few use Phelps Dodge Mine Road and the unnamed smaller roads in the northwest portion of the project area.

The most important hiking trail in the area is the Safford-Morenci Trail. Approximately 15 miles long, the trail was used in the late 1800s-early 1900s as one of the routes between Safford and the mines around present-day Morenci. Haulers used the trail to carry meat and produce to the mining communities and fuelwood to the smelters. Because of its importance to historical events in the region, the Safford-Morenci Trail has been determined eligible for listing in the *National Register of Historic Places*. The west trailhead is located along West Ranch Road. From there, the trail's route crosses the Gila Mountains north of Lone Star Mountain and descends through Johnny Creek into Bonita Creek Canyon. From Bonita Creek, it climbs to the top of Turtle Mountain at Bellmeyer Saddle on the San Carlos

Apache Reservation.[3] The trail then descends into South Smith Canyon, terminating at its east trailhead near the Eagle Creek pumping station. The Safford-Morenci Trail has not been maintained by BLM for many years and requires the use of a topographic map and compass to follow, but, based on old visitor registers, it is estimated that 50 to 75 people per year hike the physically challenging and poorly marked Trail for recreation (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998).

Through commercial special recreational permits, the BLM allows guides and outfitters to provide recreational services, including trail rides, hikes, pack trips, and hunting trips on the BLM-administered lands. The BLM Safford Field Office currently authorizes four such permits for activities in the project area. Since 1994, BLM has also granted a competitive special recreation permit for an annual 50-mile-long endurance horseback race called the Safford Johnny Creek Endurance Ride. This event crosses a portion of the project area. The permit is coordinated with other public land resources and uses and is subject to renewal on an annual basis. Participants include 85-90 riders and 30-40 spectators (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998).

The project area is located within Arizona Game and Fish Department Management Unit 28 (often called “Hunt Unit 28”). Deer, javelina, quail, and dove are commonly hunted game species in the project area vicinity. Hunting most commonly occurs 1) on public lands along the northern edge of the project area; 2) west of Salt Trap Tank; and 3) adjacent to Solomon Pass, San Juan Mine Road, and PD Mine Road. No hunting is allowed on PD-owned private lands within the project area. The BLM estimates that approximately 240 hunters use the federal lands in the project area annually. Of this number, approximately 55 hunt deer, 45 hunt javelina, 110 hunt quail, and 30 hunt dove (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998).

3.2.1.3 Encumbrances

Encumbrances on public lands include rights-of-way (ROWs) and easements. There are seven ROWs appurtenant to the project area (SWCA 1996f). Six of the ROWs were granted for transmission lines for either telephone and telegraph or electric power service to PD or previous mine operators. Table 3-3 below identifies the ROW grantees and the locations of the ROWs/authorizations. Locations of the ROWs are depicted on Figure 3-2.

3.2.1.4 Agriculture and Grazing

The U.S. Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service [SCS]) is responsible for identifying prime or unique farmlands. No prime farmlands have been designated in the project area (SCS November 1983 Map entitled “Important Farmlands, Graham County, Arizona”), although such lands have been designated south of the project area within the floodplain of the Gila River and along Highway 191 south of Safford.

The BLM Safford Field Office administers 260 grazing allotments. All the public lands proposed for mining use and exchange are currently included within six of these allotments: the Bryce, Talley Wash, Rest Haven, Johnny Creek allotment, Lone Star allotment, and Bonita Creek allotment (Figure 3-3). Table 3-4 gives the total acreage of BLM-administered lands and selected lands within these six allotments, the corresponding stocking capacity in Animal Unit Months (AUMs) supported by these lands, and BLM-registered range improvements on the selected lands for each allotment (SWCA 1997j). The locations of these range improvements are depicted in Figure 3-3.

BLM receives income from annual grazing fees paid by range allottees. At the anticipated 2000 federal grazing fee of $1.35 per AUM, Safford Field Office’s 2000 income from grazing revenues on the selected lands portions of the allotments would be approximately $882, which represents about eight percent of the Field Office’s total annual 1999 grazing receipts of $10,436 from these allotments (Table 3-5).

3.2.1.5 Mineral Rights

Real property carries with it certain rights that can be owned. Two of these rights are commonly referred to as the surface estate and the mineral estate. For any given property, a single entity can own both estates, creating what is commonly referred to as "whole estate," or different entities can own either estate independently of the other, creating what is commonly referred to as “split estate.” Within the project area, split estate occurs in Section 36 or Township 5 South, Range 26 East; Section 16 of Township 6 South, Range 26 East; and Section 32 of Township 5 South, Range 27 East, where the United States owns and BLM administers, the surface estate, while the State of Arizona owns the

[3] Trail users must contact the San Carlos Apache Tribe and the Arizona State Land Department to acquire the necessary permits to use the portions of the trail that traverse the San Carlos Apache Reservation and state lands, respectively.

mineral estate. In Section 21 of Township 5 South, Range 26 East, the BLM administers the mineral estate to the SW¼ of the NW¼ of that section, while the State owns the surface estate and the remainder of the mineral estate of the northern half. All property rights in the southern half of Section 21 are owned by PD.

In Sections 16, 32, and 36 discussed above, the split estate resulted from a land exchange between the BLM and the State of Arizona completed in 1941 and 1942, in which Arizona retained ownership to the mineral estate. In Section 21, a similar land exchange completed in 1945 resulted in the BLM retaining administrative responsibility for 40 acres of mineral estate.

3.2.1.5.1 Federal Minerals. On the BLM-administered lands within the project area, approximately 844 mining claims have been filed by PD (Wahl 1997a). R.L Whitmore and others own 40 claims on BLM lands near the project area, known as the Melody Claims (ibid.), which are excluded from the MPO and the exchange. The location of the Melody Claims relative to the project area is shown on Figures 1-2 and 3-2.

The BLM has not entered into any mineral leases, such as for oil, coal, or gas, or salable mineral contracts, such as for sand and gravel, for lands in the project area. In the Agreement to Initiate (ATI), BLM segregated the selected lands from further appropriation under mineral laws for a period of five years from the date of notation. The segregation was renewed in 1999 by BLM. This precludes additional mining claims from being made on the selected lands while the environmental review process for the Project is underway.

3.2.1.5.2 State of Arizona Minerals. The State of Arizona has retained the mineral rights to Sections 16, 32, and 36 within the project area; BLM administers the surface rights. Completion of a land exchange that includes these areas would be subject to the State's rights to these minerals. PD holds mineral exploration permits from the State for the northern half of the State-owned mineral estate and for Section 36, T5S, R26E and a mineral lease for the southern half in Section 32, T5S, R27E. There are no permits or leases on the state-owned minerals in Section 16, T6S, R26E.

Table 3-3. Rights-of-Way Authorized on the Project Area

Right-of-Way Type (BLM ROW #)	**Grantee**	**General Location**
Electric Power Distribution Line (AZA 1091)	Graham County Electric	SE¼SW¼, sec. 2; E½E½SE¼, sec. 10; W½, sec. 11; NW¼NW¼, sec. 14; E½E½, sec. 15, T6S, R26E
Telephone and Telegraph Line (AZA 2773)	Qwest Communications	Lots 2, 3, and 4, N½SE¼, sec. 34, T5S, R26E; and lots 6, 8, 9, E½SW¼, sec. 2, T6S, R26E
Electric Power Transmission Line (AZA 5340)	Graham County Electric	S½SE¼SW¼, sec. 2; N½NW¼NE¼, N½NE¼NW¼, sec. 11, T6S, R26E
230 kV Electric Power Transmission Line (AZA 9015)	Sierra Southwest Transco (fomerly AEPCO)	Lot 4, W½SW¼, sec. 4; NE¼, N½NW¼, sec. 9; S½NW¼, N½SW¼, SE¼, sec. 10; S½SW¼, sec. 11; NE¼, N½NW¼, sec. 14, T6S, R26E; S½NW¼, sec. 20, T6S, R27E
Radio Station Site and Access Road (AZAR 029939)	Qwest Communications	SE¼SW¼, SW¼SE¼, sec. 2, T6S, R26E
Telephone and Telegraph Line (AZA 11857)	Qwest Communications	N½NE¼, S½SE¼NW¼, NE¼NW¼SW¼, N½SE¼NW¼SW¼, S½SE¼NW¼SW¼ sec. 35, T6S, R27E

Table 3-3. Rights-of-Way Authorized on the Project Area

Right-of-Way Type (BLM ROW #)	**Grantee**	**General Location**
7.5 kV Electric Power Line (AZA 20635)	Phelps Dodge Corporation	S½SW¼, sec. 2; NW¼SW¼, N½SE¼SE¼, SW¼NE¼SE¼, S½NW¼SE¼, sec. 3; S½NE¼, SE¼NW¼, NW¼NW¼, NE¼NE¼SE¼, sec. 4; and lot 1, sec. 5, T6S, R26E

3.2.1.6 Surface Water Rights

Surface water rights are appurtenant to the lands upon which the water is beneficially used and the holder of a water right must own or possess the land to which the right is appurtenant (ADWR, Comment Letter No. 63). Surface water rights totaling 17.69 acre-feet per year (af/yr) have been filed for the selected lands and are listed in Table 3-6. On the selected lands, BLM holds 11 water rights totaling 9.06 af/yr; an individual, K.W. Curtis, holds four water rights totaling 2.50 af/yr; an individual, J. Menges, holds one water right for 0.61 af/yr; an individual, G.A. Golding, holds one water right for 1.12 af/yr; Page Land and Cattle Co. (PL&C) holds 10 water rights totaling 1.60 af/yr; and PD holds four water rights totaling 2.80 af/yr. All these surface water rights have been designated for stock watering or wildlife purposes. The selected lands are not in an Active Management Area (AMA) or Irrigation Non-Expansion Area (INA) under the State of Arizona 1980 Groundwater Management Act. On PD's private lands in the project area, four separate entities hold five water five rights totaling 77.65 af/yr (Table 3-7). All these water rights have been designated for stock watering or wildlife purposes.

Table 3-4. Approximate Acreages and Stocking Capacity for BLM Lands and Selected Lands within Six Range Allotments
(Percents given as percent of total allotment. Range Improvements listed for selected lands only)

ALLOTMENT (Operator)	ALLOTMENT ACREAGE			STOCKING CAPACITY (Animal Unit Months, or AUMs)		RANGE IMPROVEMENTS
	Total Allotment	BLM land	Selected Lands	Total BLM AUMs	Selected Lands AUMs	
Bryce Allotment (Gary Bryce)	54,000	20,470 (38%)	1,715 (3%)	1,407	45	1. Bryce/Talley Wash boundary fence (#48)
Talley Wash Allotment (Page Land & Cattle Co.)	9,703	6,901 (71%)	4,320 (45%)	127	57	1. Stewart/Golding fence (#274) 2. Dirt tank (#665) 3. Dirt tank (#666) 4. Dirt tank (#667)
Rest Haven Allotment (Bud Smith & Bob Bell)	2,317	1,868 (81%)	232 (10%)	Designated ephemeral--no stocking capacity indicated		1. 4612/4613 boundary fence77
Lone Star Allotment (Phelps Dodge Corp.)	31,829	18,264 (57%)	5,681 (18%)	1,052	189	1. GA reservoir (#1417) 2. John corral (#1340) 3. Storage house well (#1347) 4. Peterson Wash pipeline (#3555)
Johnny Creek Allotment (Jeff Menges)	23,291	20,069 (86%)	4,225 18%)	1,804	325	1. Rattlesnake fence (#923) 2. Rattlesnake tank (#926) 3. Mark tank (#1374) 4. Below Boo tank (#845) 5. Osito reservoir (#4088) 6. Interior Pasture Fence (#794) 7. Golding/West fence (#284) 8. Burro pipeline (#4428)
Bonita Creek Allotment (Carlos Amado)	25,171	24,361 (97%)	124 (<1%)	3,341	16	1. Dry Canyon tank (#1237) 2. Sam corral (#1243) 3. Boundary fence (#134)
TOTAL	**146,311**	**91,933 (63%)**	**16,297 (11%)**	**7,731**	**632**	**24 Improvements**

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Table 3-5. BLM Income for 1997 from Six Grazing Allotments and Selected Lands Portions of the Allotments

Allotment	Total 1997 BLM Grazing Fee	Fees from Selected Lands Portion Only	Percent of Total Income from Selected Lands
Bryce Allotment	$1,900	$61	3%
Talley Wash Allotment	$171	$77	45%
Rest Haven Allotment	$0	$0	N/A*
Lone Star Allotment	$1,420	$255	18%
Johnny Creek Allotment	$2,435	$439	18%
Bonita Creek Allotment	$4,510	$22	<1%
Total Income	**$10,436**	**$854**	**8%**

*N/A = not applicable to ephemeral allotments

3.2.1.7 Blasting Noise and Vibrations

There are currently no discharges of explosives or mining-related noise and vibrations in the project area.

3.2.1.8 Visual Resources

The project area lies on a gradually sloping, hummocky alluvial fan terrace and low foothills along the south-facing flank of the Gila Mountains. Numerous large and small drainages score the often-cobbly/gravelly landscape surface. The general landscape in the project area is predominately natural desert upland in character, with about 521 acres disturbed by former mine operations. The following characterization of the existing land/water, vegetation, and structures on the project area is based on the view from Highway 70 near 20th Avenue (Knox 1997). Foreground and middleground views (referred to here collectively as fore-middleground views) are defined as zero to two miles in distance from the viewpoint; background views range from two miles to the horizon at the crest of the Gila Mountains roughly 10 miles away. The project area lies within the background of a commonly viewed scene visible from the City of Safford; neighboring towns; and US 70 and US 191, the main transportation corridors in the vicinity of the project area.

3.2.1.8.1 Land/Water. As seen from the town center of Safford looking toward the Gila Mountains, the background view includes a natural terrace above the Gila River, sloping gently uphill to the toe of the Gila Mountains and its foothills. The Gila Mountains are steeply sloping, with angular and diagonal ridges rising to the crest of the mountains. The horizon is formed by the crest, which undulates against the skyline. The fore-middleground view is composed of flat agricultural fields that stretch from the observation point northward to the Gila River and its floodplain. Due to the distance between the project area and most in-town viewers, the landscape appears as fine or smooth-textured land, with occasional rough-textured cliffs, rock outcrops, and some dirt roads seen as curvilinear, gray-colored lines. The color of the mountains is mostly gray, with blue to purple tints that vary with the time of day.

Table 3-6. Surface Water Rights on the Selected Lands

Surface Water Right Number	Holder Name	Water Source	Annual Volume (af)	Specified Use[1]	Location			
					S	T	R	¼ Sec
36-0072391	Page Land & Cattle (PL&C)	Bowman Tank Draw	0.20	S	33	5S	26E	SE, SW
36-0072392	PL&C	Mineral Claim	0.15	S	3	6S	26E	SE, NW
36-0072393	PL&C	Cueto Tank	0.20	S	8	6S	26E	SW, NE
36-0072394	PL&C	Blocky Tank	0.15	S	9	6S	26E	NE, NW
36-0072395	PL&C	Stewart Tank	0.10	S	9	6S	26E	SW, NW
36-0081002	J. Menges	Walnut Spring	0.61	S	26	5S	26E	SE, SE
38-0019177	BLM	Unnamed	2.00	S, W	9	6S	27E	NE, NE
38-0019207	BLM	Unnamed	0.10	S, W	2	6S	26E	SW, NE
38-0019208	BLM	Talley Wash	0.10	S, W	4	6S	26E	SE, SW
38-0019209	BLM	Cottonwood Wash	0.10	S, W	3	6S	26E	NE, NE
38-0019287	BLM	Unnamed	1.30	S, W	35	5S	26E	SE, SE
38-0019390	BLM	Bear Spring	1.30	S, W	36	5S	26E	NW, NE
38-0019393	BLM	Bear Spring	3.80	S, W	31	5S	27E	SE, NW
38-0024930	P D	Runoff	0.70	S	17	6S	27E	NW, SW
38-0024931	P D	Runoff	0.70	S	33	5S	27E	SW, NW
38-0024934	P D	Runoff	0.70	S	3	6S	27E	SW, SW
38-0024941	P D	Runoff	0.70	S	2	6S	26E	SW, NE
38-0027727	K. W. Curtis	Ben Hur Canyon	0.25	S, W	31	5S	27E	NE, NW
38-0027731	K. W. Curtis	Ben Hur Canyon	0.25	S, W	36	5S	26E	NW, NE
38-0027734	K. W. Curtis	Spring Canyon	1.00	S, W	33	5S	27E	NE, NW
38-0027738	K. W. Curtis	Various Canyons	1.00	S, W	32	5S	27E	NE, SE
38-0072385	PL&C	Bowman Tank Draw	0.20	S	33	5S	26E	SE, SW
38-0072386	PL&C	Stewart Tank	0.10	S	9	6S	26E	SW, NW
38-0072387	PL&C	Blocky tank	0.15	S	9	6S	26E	NE, NW
38-0072388	PL&C	Cueto Tank	0.20	S	8	6S	26E	SW, NE
38-0072389	PL&C	Mineral Claim	0.15	S	3	6S	26E	SE,NW
38-0089916	BLM	Peterson Wash	0.10	S, W	26	5S	26E	NE, SE
38-0089919	BLM	Wilson Wash	0.13	S,W	14	6S	26E	NW, SW
38-0089920	BLM	Unnamed	0.06	S, W	17	6S	26E	NE, NW
38-0089921	BLM	Unnamed	0.07	S, W	3	6S	27E	NW, NW
4A-0001675	G.A. Golding	Cottonwood Wash	1.12	S	26	5S	26E	SE, SE
		TOTAL	**17.69**					

[1] S= Stock watering, W = Wildlife
Source: ADWR 1995 and 1996.

Table 3-7. Surface Water Rights on PD's Private Lands in the Project Area

Surface Water Right Number	Holder Name	Water Source	Annual Volume (af)	Specified Use[1]	Location			
					S	T	R	¼ Sec
36-0060073.1	G.A. Bryce	Little Spring No One	1.61	S	32	5S	26E	NW, NE
36-0072390	PL & C	Hackberry Spring	0.30	S, W	27	5S	26E	NW, NW
4A-0001418	PL & C	Fork of Hackberry Wash	72.38	S	27	5S	26E	NW, SW
4A-0002477	A.T. West	Cottonwood Spring	1.68	S	27	5S	26E	SE, SE
4A-0002478	G.A. Golding	Cottonwood Tunnel Spring	1.68	S	34	5S	26E	NE, NE
		TOTAL	**77.65**					

[1]S= Stock watering, W = Wildlife
Source: ADWR 1995 and 1996.

3.2.1.8.2 Vegetation. Vegetation (primarily clumps of creosote bush) on the project area is generally sparse and evenly distributed; from a distance, it appears fairly smooth and is not distinguishable as a separate visual resource from the landform on which it grows. No distinct lines are formed by the vegetation communities on the project area; rather, the vegetation appears to flow continuously over the landscape. During the growing season(s), the vegetation lends an overall olive-green tint to the landscape of the project area contrasting with the bright greens of the cotton fields and golden yellows of the wheat fields visible in the fore-middleground views. Although the Gila River lies in the fore-middleground, and cannot be seen from view points in town, the riparian vegetation along its banks is clearly visible from this viewpoint and provides a curvilinear greenbelt that helps to define the interface of fore-middleground with background views of the project area.

3.2.1.8.3 Structures. Existing tanks and buildings associated with former mining operations are visible on the lower elevations of the project area as tan-colored cylinders, rectangles, or squares. These structures form short horizontal and vertical lines. No structures protrude above the horizon at the crest of the Gila Mountains. Square, rectangular, and odd-shaped structures in the fore-middleground are primarily related to agricultural land uses and include tan buildings, gray-colored tanks, red and green farm equipment and machinery, and tan-colored power poles.

3.2.1.8.4 VRM Classification. The Safford District RMP (BLM 1991) designated the Gila Mountains a Visual Resource Management (VRM) Class III[4] area (see Appendix C for definition of classes). The RMP also designated lands south of the Gila Mountains VRM Class IV. The RMP, however, did not define the boundary between VRM Class III and Class IV in the vicinity of the project area. The BLM's VRM Manual states that "the approved VRM objectives shall result from, and conform with, the resource allocation decisions made in RMPs" (VRM Manual 8410.06 policy A.2, BLM 1986). For the purposes of this analysis, BLM has determined that the lands in the project area should be managed by VRM Class IV objectives for the following reasons: the project area is located in the foothills and alluvial fan terrace lying south of the Gila Mountains; the RMP did not withdraw public lands in the Gila Mountains from mineral entry; the RMP acknowledges the existence of mines and orebodies in the Safford Mining District; and the RMP predicts development of mines in the mining district. Class IV objectives would conform with other resource allocation decisions of the RMP and would be consistent with the visual characteristics of open pit copper mining.

3.2.1.8.5 Nighttime Lighting. Other than the few existing structures on the project area near Site No. 2 that have exterior lights,

[4] Under the BLM's Visual Resource Management (VRM) system, public lands are designated as one of four classes, depending upon the property's natural scenic value. Classes I and II apply to areas with the greatest scenic value; Class III to areas with moderate scenic value; and Class IV to areas with the least scenic value (BLM 1986; see Appendix C for the management objectives of Classes I through IV).

there are no nighttime activities currently on-site that illuminate the project area. In general, nighttime views of the Gila Mountains from town show a dark, unlit scene in which the project area cannot be discerned. In part, this is because scattered light from exterior lights in town and at the prison on the east side of town in the fore-middleground view obscure the few, small, exterior building lights that currently exist on the project area. It should be noted that the ability of the viewer to discern nighttime views of the Gila Mountains themselves varies with moonlight conditions; on moonlit nights, the Gila Mountains are silhouetted against the night sky and appear as a solid black landform with an undulating crest. On moonless nights, the Gila Mountains and sky merge into a solid dark flat "wall" with no discernible land/water, vegetation, or structural features.

3.2.1.9 Hazardous Materials

A Phase I Environmental Site Assessment for potential environmental liability of the public lands proposed for the Project was conducted (Zenitech 1998a). The assessment was conducted in accordance with American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, E 1527, and involved aerial and site reconnaissance, review of public agency records and applicable federal, state and local records, and personal interviews. The results of this investigation for potential environmental liabilities are as follows (ibid):

- A review of agency databases indicated that none of the project area is located on or within one mile of a federal National Priority List site or an Arizona Water Quality Assurance Revolving Fund (WQARF)[5] site.
- One zipACIDS[6] site, the San Juan Mine zipACIDS site (EPA ID AZ0000309203), was located on or within one mile of the project area. This site is located primarily on existing PD-owned land, with a portion of the site on the selected lands. The zipACIDS list is a compilation of locations, sorted by zip code, subject to investigation under Arizona's WQARF program and the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for possible contamination of soil, surface water, or groundwater. Inclusion of any facility or site on this list *does not* mean that the location is contaminated, is causing contamination, or is in violation of state or federal statutes or regulations.
- No Resource Conservation and Recovery Act (RCRA) transport, storage, or disposal facilities are located on or within one mile of the project area.
- No Emergency Response Notification System (ERNS) sites are located on or in the vicinity of the project area.
- No registered Underground Storage Tanks (UST) sites are located on the project area or on adjacent properties.
- No Leaking Underground Storage Tanks (LUST) sites are located on or within 0.5 mile of the project area.
- No open or closed landfills are located on or within 0.5 mile of the project area.

PD was aware of the status of the San Juan Mine as a zipACIDS site when it purchased the mine in 1994 from a consortium of private owners. Upon acquisition of the property, PD initiated voluntary clean up activities on remedial disturbed areas that involved removal and disposal of tires, scrap metal, pipe, trash and other debris that remained from previous mining and leaching activities conducted by the former operators.

Additionally, PD contracted with a consultant to design and oversee the installation of a stormwater management system, which includes lined channels and pipe drains to divert stormwater flows from the northern area of the leach stockpiles to the existing open pit mine. While this drainage system was being installed, an existing, unlined leach collection pond downgradient from the leach stockpiles was converted to a lined stormwater collection and evaporation pond. To do this, a trench was dug down to bedrock between the stockpiles and the pond. The trench acted to intercept and temporarily store surface and subsurface stormwater flowing from the stockpiles to the pond. The pond area was allowed to dry up, then it was partially excavated, contoured, and lined with a composite liner system consisting of a sublayer of a minimum of six inches of compacted clay overlain by a high density polyethylene (HDPE) synthetic liner of 60 mil thickness. The liner was extended to the interception trench and draped down against the downgradient wall of the trench. The trench was then backfilled with gravel, and six shallow reclaim wells were installed to pump intercepted stormwater seepage from the ditch into the lined pond to be evaporated. The Arizona Department of Environmental Quality (ADEQ) has determined that these improvements to the existing leach collection pond at San Juan will be subject to the Aquifer Protection Permit review process and will be treated as a new facility.

3.2.2 Physical Resources

[5] This is a state "Superfund" program which focuses on groundwater quality.

[6] Arizona CERCLA Information and Data System.

3.2.2.1 Local Climate

Climate in the Safford Valley is temperate and semi-arid, with a growing season of about 200 days per year (Sellers and Hill 1974). The average daily maximum and minimum temperatures are 80.8° and 47.7°F, respectively; recorded temperatures range between 7° and 114°F. Winters are warm and dry; summers, hot and somewhat wetter. Average annual precipitation is 9.8 inches; the evaporation rate is high. A mountain range, the over 10,000-foot-high Pinaleños, about thirteen air miles to the southwest of the City of Safford, produces a rain-shadow effect in which much of the winter precipitation falls on the windward side of the mountains before reaching Safford. Summer precipitation in the form of thunderstorms originates from the Gulf of Mexico and represents more than half the annual total rainfall received. The Gila Mountains, with maximum elevations exceeding 6,000 feet and a southeast-to-northwest orientation, serve to funnel summer thunderstorm activity northwestward down the valley. Winds measured in the project area during 1995-1996 blew predominantly from the west northwest and northwest (41.3 percent of measurements) and secondarily from the east and east southeast (19.8 percent of measurements) (Class One Technical Services 1997). This pattern is characteristic of drainage either up or down the Safford Valley. Such winds usually occur during the day at average or above average speeds. They tend to be more turbulent than nighttime winds, exhibiting greater potential for dispersion of pollutants. At night, winds most often blow at low speeds down the slope of the Gila Mountains from the east or east-northeast. Wind speeds during 1995-1996 averaged 15.3 feet (4.6 meters) per second (ibid.)

3.2.2.2 Air Quality

3.2.2.2.1 Criteria Pollutants.[7] Applied Environmental Consultants, Inc. (AEC) of Tempe, Arizona, conducted ambient air quality impact modeling for the project area (AEC 1999). Four criteria pollutants that might reasonably be expected to emanate from the proposed mining operations were assessed, particulate matter (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO), along with two types of pollutants from the Arizona Ambient Air Quality Guidelines (AAAQG) list, sulfuric acid (H_2SO_4) mist and speciated volatile organic compounds (VOCs). Within the model, one set of receptors traced the process area boundary[8] at 25-meter intervals, and three other sets formed a coarse grid with receptors spaced at 100-meter intervals extending outward from the process boundary to 1 kilometer, 200-meter intervals from 1 km to 5 km, and 500-meter intervals from 5 km to 10 km (see Figure 3-4). In addition, the model included special receptors in each of the following locations: downtown Safford, the Safford Municipal Airport, the nearest residence, the San Carlos Apache Reservation boundary, and two Class I areas (the Galiuro Wilderness and the Gila Wilderness).

The Safford area is currently classified as "attainment" (i.e., better than national standards) for SO_2, and "unclassifiable" for PM_{10}, NO_2, and CO. Background levels for each of these criteria pollutants are summarized in Table 3-8. Because representative long-term data are not available from the project area, the values used to represent "existing conditions" come from state monitoring sites with the most comparable conditions (AEC 1999, 2003a). Background concentrations of the AAAQG pollutants are not required and were not considered in the air quality analysis. A conformity analysis was not required because the project area is not located in a non-attainment area for a criteria pollutant.

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[7] Criteria pollutants are the six compounds most commonly associated with degraded air quality and for which the EPA has formulated National Ambient Air Quality Standards (NAAQS). The pollutants include the four compounds analyzed in this study plus lead and ozone. Typically, modeling for lead and ozone is conducted only in urban areas, where automobile and industrial emissions often result in concentrations of lead and ozone large enough to significantly degrade air quality. Precursors to ozone include nitrogen oxides (No_x), which were analyzed in this study.

[8] ADEQ policy for air permitting requires the delineation of a process boundary, a perimeter within which public access is reasonably limited and outside of which public access is not reasonably limited. Public exposure to airborne pollutants is assumed to occur only in areas where public access is not reasonably limited (Class One Technical Services 1997).

Major stationary sources of air pollution and major modifications to major stationary sources are required by the Clean Air Act (CAA) to obtain an air pollution permit before commencing construction. The process is called New Source Review (NSR) and is required whether the major source or modification is planned for an area where the NAAQS are exceeded (non-attainment areas) or an area where air quality is acceptable (attainment and unclassifiable areas). Permits for sources in attainment areas are referred to as prevention of significant air quality deterioration (PSD) permits; while permits for sources located in non-attainment areas are referred to as NAA permits. The entire program, including both PSD and NAA permit reviews, is referred to as the NSR program. The basic goals of the PSD regulations are: (1) to ensure that economic growth will occur in harmony with the preservation of existing clean air resources to prevent the development of any new non-attainment problems; (2) to protect the public health and welfare from any adverse effect which might occur even at air pollution levels better than the NAAQS; and (3) to preserve, protect, and enhance the air quality in areas of special natural recreational, scenic, or historic value, such as national parks and wilderness areas. The primary provisions of the PSD regulations require that new major stationary sources and major modifications be carefully reviewed prior to construction to ensure compliance with the NAAQS and the applicable PSD air quality.

Table 3-8. Summary of Background Concentrations of Criteria Pollutants Used in Modeling the Project Area

Pollutant	Averaging period	Background level	Source of background level estimate
PM_{10}	Annual	12.3 : g/m^3	Montezuma Castle monitoring site*
PM_{10}	24-hour	27.7 : g/m^3	Montezuma Castle monitoring site*
SO_2	Annual	1 : g/m^3	Springerville monitoring site**
SO_2	8-hour	22.0 : g/m^3	Springerville monitoring site**
SO_2	3-hour	94.0 : g/m^3	Springerville monitoring site**
NO_2	not given	1.9 : g/m^3	Springerville monitoring site**
CO	8-hour	1,219 : g/m^3	Casa Grande monitoring site**
CO	1-hour	3,200 : g/m^3	Casa Grande monitoring site**

* Although from a location outside of the project study area, Montezuma Castle monitoring station data were used because they are representative of the rural setting and elevation of the project site.
** All monitoring sites in Arizona that measure these three pollutants are closer to an electrical generating station, smelter, and/or a metropolitan area than the project area; therefore, all measured concentrations are likely to be higher than those in the project area. Following ADEQ guidance, the average from the last three years of available data was used to represent background concentrations.
Source: AEC 2003a.

The Project lies within the Southeast Arizona Intrastate Air Quality Control Region (AQCR) which encompasses the counties of Cochise, Graham (Project's County), Greenlee and Santa Cruz. This AQCR represents the "baseline area" for PSD purposes. The PM_{10}, SO_2 and NO_2 minor source baseline date for the Southeast Arizona Intrastate AQCR was triggered on April 5, 2002 by ADEQ's completeness determination for the Bowie Power Station Project application. The Project will be a minor stationary source and not subject to PSD permitting. For purposes of this EIS, however, it is assumed that the Project will consume PSD increments.

3.2.2.2.2 Class I Airsheds. A Class I airshed is a management designation for some, but not all, national parks, monuments, wildernesses, primitive areas, preserves, recreational areas, wild and scenic rivers, wildlife refuges, and lakeshores and seashores. Under the Clean Air Act regulations, projects are not allowed to further degrade the atmospheric visibility for any Class I airshed within 100 kilometers (62 miles) (40 CFR 50). Although the Project is not large enough to be subject to visibility analysis, PDSI voluntarily arranged for such an analysis to determine if visual impacts would occur for views within nearby Class I airsheds.

Figure 3-5 depicts the only two Class I airsheds within a 100-kilometer (62-mile) radius of the project area: the Galiuro Wilderness in the Coronado National Forest, Arizona, and the Gila Wilderness in the Gila National Forest, New Mexico. The closest boundary of the Galiuro Wilderness to the project area lies about 66.6 kilometers (41.4 miles) to the southwest. This wilderness is approximately 31 kilometers (19 miles) long and approximately 14 kilometers (9 miles) wide at the widest point. It consists of a northwest-southeast-trending mountain ridge dissected by two separate ridges in the north by Rattlesnake Creek and in the south by Redfield Canyon. The closest boundary of the Gila Wilderness is approximately 85 kilometers (52.8 miles) (measured in a straight line) east-northeast of the project area. The terrain along this straight line is rough and broken. It crosses several major river drainages, canyons, and mountains, rising to approximately 6,000 feet, approximately 1,800 feet above the average project area elevation. The highest elevation at the Gila Wilderness boundary is approximately 7,000 feet (Class One Technical Services 1997).

3.2.2.3 Geology

The project area lies along the northern margin of the Basin and Range Physiographic Province in Arizona. This province covers about a third of Arizona south of the imaginary diagonal line that runs from the head of Lake Mead in the northwest corner down to the vicinity of the Gila River's entry into Arizona in the southeast corner (Nations and Stump 1981). The Basin and Range province is characterized by heavily eroded, northwest-trending, elongated mountain ranges separated by broad valleys. The mountains are tilted blocks of often structurally deformed rock bounded by faults, and the valleys are intermontane basins that have been filled to great depths by sediments washed down from the adjacent eroding mountain ranges. If a stream has flowed through the valley or a lake formed, the basin fill could also include floodplain or lacustrine deposits. Both the mountain ranges and the deep basins were created during the Tertiary Period when the earth's crust stretched in this region, causing extensive movement along pre-existing and newly created fault zones. The blocks of rock between the faults moved and tilted, some slipping downward (called normal faulting) thousands of feet along the faults to form deep basins. The tilted blocks left in high relief formed the mountain ranges. The project area is located on the lower, south-facing slopes of one of these northwest-trending mountain ranges, the Gila Mountains.

3.2.2.3.1 Local Geology. Dames & Moore (1997a) defines five lithologic (rock or sediment) units in the project area. Beginning with the oldest, they are the 1) Safford Volcanics,[9] 2) quartz monzonite-granodiorite porphyry, 3) Gila Mountain Volcanics, 4) Lower Basin Fill, and 5) recent alluvium (see Figure 3-6 for surface geology and Figure 3-7 for cross-sectional view of the project area). The oldest lithologic unit, the Safford Volcanics, commonly referred to as the "premineral andesite," dates from the Late Cretaceous-Paleocene (Laramide age). It is composed primarily of andesite that was later (during the Paleocene and Eocene) intruded by the dikes, sills, and stocks of the second lithologic unit, the quartz monzonite-granodiorite porphyry. This porphyry is the mineralizing unit responsible for the copper deposits in the project area. The deposits include both copper oxides and copper sulfides, which are commercially processed using different extraction techniques. About 75 percent of the known copper ore in the Safford Mining District has been found along fractures in the Safford Volcanics, and about 25 percent has been found in the porphyritic intrusions themselves. The Safford Volcanics and some porphyritic rocks are exposed at the surface in the northeastern part of the project area, as depicted in surface geology map (Figure 3-6).

The third lithologic unit is the younger, unmineralized Gila Mountain Volcanics, which are Miocene-to-Late-Pliocene-age rocks composed of basalts, tuffs, rhyolites, and agglomerates. Located only in the western portion of the project area, these volcanics are overlain, for the most part, by the fourth unit, the Lower Basin Fill sediments of Pliocene and Early Pleistocene age. This unit comprises semiconsolidated to consolidated conglomerates washed down in great alluvial fans from the eroding Gila Mountains, and finer-grained lacustrine deposits left behind by a lake that once filled the Safford Basin. Basin Fill is estimated to have reached depths of 1,500 feet or more. Beginning in the Late Pleistocene, the Gila River began eroding the fill, carving the alluvial fans on both sides of the Valley into a series of more gently graded terraces. The lowest terrace face appears as a line of bluffs bordering each side of the current Gila River floodplain.

Overlying all earlier units in various locations throughout the project area are deposits of the fifth unit: recent alluvium. This is unconsolidated material has been deposited since the Pleistocene, primarily by runoff in wash channels and floodplains. Some of this recent material also takes the form of relatively small alluvial fans superimposed on the terraces.

Outside the project area, a sixth lithologic unit is recognized. This is the Upper Basin Fill, a fine-grained floodplain deposit that overlies the Lower Basin Fill on the Safford Valley floor. These deposits began to

[9] Called the Safford Metavolcanics by Langton and Williams (1982). Langton and Williams also recognized an overlying younger unit, the Baboon Metavolcanics (a postmineral andesite), in the project area. Dames & Moore (1997a) has subsumed the Baboon Metavolcanics into their Safford Volcanics unit.

form only after the ancient lake had filled in and a through-flowing river was established.

Three major fault systems have been identified in the project area: the Butte (Foothill) Fault, the Valley Fault, and the Southwest Fault (Figures 3-6 and 3-7). Several smaller faults and sheer zones are present as well. The Butte Fault is a regional, northwest-trending, Basin and Range normal fault. Movement along this fault has caused rocks to the southwest to slip downward relative to the rocks to the northeast. Consequently, rock layers that were actually deposited one on top of the other are now exposed at the surface side-by-side; the Gila Mountain Volcanics and Lower Basin Fill southwest of the fault are adjacent to the older Safford Volcanics northeast of the fault. Where the Butte Fault cuts across the Dos Pobres copper deposit, it has displaced the southwestern one-half to one-third of the deposit downward some 3,000 feet relative to the northeastern part (PDSI 1997). The proposed Dos Pobres pit will straddle the Butte Fault. Gila Mountain Volcanics will be exposed in the pit's southwestern walls, and Safford Volcanics and quartz monzonite porphyry will be exposed in the northeastern walls. In contrast, the ultimate San Juan pit will lie entirely to the northeast of the Butte Fault, so only Safford Volcanics and quartz monzonite porphyry will be exposed in its walls. All the rocks that will be exposed in the walls of both the Dos Pobres and San Juan pits are relatively low in hydrothermal sulfide concentrations, which are acid-generating, and high in alkali volcanics, which are calc-alkaline.

The Valley Fault, a west-northwest striking normal fault, lies generally southwest of the Butte Fault but angles toward it. The two faults intersect roughly a mile south of the San Juan pit (Figure 3-6). The wedge of rock between the faults has slid downward relative to the rocks on either side, forming a down-thrown feature called a graben (Figure 3-7). The rocks within the graben, consisting of Lower Basin Fill and Gila Mountain Volcanics, are highly fragmented as a result of this downward movement, and are generally more permeable than the older Safford Volcanics. South of the Valley Fault, the Lower Basin Fill thickens substantially, reaching depths of 1,000 feet in the southwestern-most part of the project area.

The Southwest Fault, located about three miles southwest of the Valley Fault and roughly parallel to it, is a normal fault that probably dips toward the southwest. The fault location is inferred from water quality and other geological data, but is not exposed at the surface.

3.2.2.3.2 Mineral Potential. Mineral resources are defined as concentrations of naturally occurring solid, liquid, or gaseous materials in or on the earth's crust in such form that economic extraction of a mineral resource is currently or potentially feasible (Wahl 1997a). Wahl evaluated the selected lands for the potential occurrence of mineral resources in the form of both disseminated copper and related mineralization (e.g., molybdenum, lead, zinc, gold, and silver), as well as underground mineral resources, as one of many considerations in the appraisal process for the selected lands. His study area comprised three blocks of selected lands labeled Dos Pobres, San Juan, and Lone Star (Figure 3-8). Areas corresponding to one-square-mile land sections within these blocks were evaluated for mineral potential. These areas are labeled alphabetically in Figure 3-8.

After reviewing extensive exploration data collected by PD for portions of the selected lands, and studying surface exposures, Wahl (1997a) determined that the potential[10] for accumulation of disseminated copper deposits suitable for open-pit mining in most of the selected lands is low at a moderate level of certainty (Table 3-9). However, parts of the selected lands are classified as having moderate to high open-pit mineral potential at moderate to high levels of certainty, as described below. The underground mineral potential was judged to be low to moderate at moderate levels of certainty (Table 3-10).

[10] "Potential" refers to the likelihood for occurrence of a concentration of one or more mineral resources. This mineral potential evaluation uses five categories: zero (0), low (L), moderate (M), high (H), or not determined (ND), with four levels of certainty (A-D), defined as follows: A = available data are insufficient and/or cannot be considered as direct or indirect evidence to support or refute the possible existence of mineral resources within the respective area; B = available data provide indirect evidence to support or refute the possible existence of mineral resources; C = available data provide direct evidence but are quantitatively minimal to support or refute the possible existence of mineral resources; D = available data provide abundant direct and indirect evidence to support or refute the possible existence of mineral resources.

Wahl (1997a) reported that primary sulfide mineralization appears to be well developed below leachable ore in the Dos Pobres and Lone Star deposits, but not in the San Juan deposit. Because development of sulfide mineralized deposits is seriously constrained by economic and environmental considerations at this time, mineral potential evaluation efforts were directed primarily toward leachable (oxide) mineral deposits.

The only selected lands determined to have high open-pit mineral potential at a high level of certainty occur in the San Juan block. They include approximately 190 acres of selected lands (about 1.2 percent of the total selected lands) immediately surrounding the San Juan pit in parts of areas H, I1, O, and P (see Figure 3-8). These areas on the selected lands represent leachable porphyry copper mineralization of the San Juan deposit on the order of approximately 133 million tons, roughly 32 percent of the total estimated 411 million tons of the San Juan deposit's leachable ore. The remainder of the San Juan deposit lies on PD-owned land.

Table 3-9. Open-Pit Mineral Potential of the Selected Lands (refer to Figure 3-8)

Area	Mineral Potential	Level of Certainty*
Dos Pobres Block		
C, D, G, M, N, R, S, T, U, AA, AB, & AC; parts of A, B, E, & F	Low	C
parts of A, B, E, & F	Moderate	B
Lone Star Block		
I2, J, L, AE, AF, AG, AH, AJ, AK, AL, AM, & AN; parts of K, & AI	Low	C
parts of K & AI	Moderate	B
San Juan Block		
X & AD; parts of H, I1, O, P, Q, V, W, Y, & Z	Low	C
parts of P, V, W, Y, & Z	Moderate	B
parts of H, I1, O, P, & Q	Moderate	C
parts of H, I1, O, & P	High	D
parts of H, P, & Q (Joy mineralization area)	High	C

* Level of Certainty key: A through D, with D = highest certainty and A = lowest certainty.
Source: Wahl 1997a.

Another area of the selected lands with high open-pit mineral potential, referred to as the Joy area mineralization, is located west and south of the San Juan deposit. Although not well tested, the Joy area mineralization covers approximately 75 acres (about 0.4 percent of the selected lands) and contains an estimated 150 million tons[11] of mineralized material overlain by approximately 112 million tons of unmineralized development rock.

Table 3-10. Underground Mineral Potential of the Selected Lands (refer to Figure 3-8)

Area	Mineral Potential	Level of Certainty*
Dos Pobres Block		
A, B, C, D, E, F, M, N, R, S, T, U, AA, AB, & AC; part of G	Low	C
part of G (Essex area)	Moderate	B
Lone Star Block		

[11] This estimate is based on a model that assumes a tonnage factor or 12.4 cubic feet per ton and that mineralization is uniform and continuous within the modeled blocks. Much additional drilling is required in the Joy area prior to a determination that an ore reserve has been established at this location.

J, K, L, AE, AG, AH, AJ, AL, AM, & AN; parts of I2, AF, AI, & AK	Low	C
parts of I2 & AF (including Blue Jay Mine area); AI, & AK	Moderate	B
San Juan Block		
H, I1, O, P, Q, V, W, X, Y, Z, & AD	Low	C

* Level of Certainty key: A through D, with D = highest certainty and A = lowest certainty.
Source: Wahl 1997a.

Three small areas of the selected lands in the Dos Pobres and Lone Star blocks exhibit moderate potential for accumulation of limited underground copper and other metal resources at a low level of certainty. These areas are described below (refer to Table 3-10), but no acreage has been estimated for the mineralized areas.

< **Essex area.** This portion of area G in the Dos Pobres block represents Dos Pobres mineralization down-dropped to the southwest by the Butte Fault. Any potential underground development of this area would likely be tied to potential future deep open-pit development of Dos Pobres sulfide mineralization on existing patented land.

< **Lone Star Block.** Moderate potential at a relatively low level of certainty is assigned along an east-northeast trending fault and dike system (in parts of areas AI, AK, AF, and I2) where geologic conditions and limited surface geochemical data indicate a permissive environment for accumulation of copper plus precious metal mineral resources in steep veins.

< **Blue Jay Mine area.** Moderate potential for the accumulation of small-scale underground mineral resources is assigned to a portions of areas AF and I2 containing narrow veins of the Blue Jay mine west of Lone Star. Copper oxides are present locally along the veins, and concentrations of copper and other metals could exist at depth.

Wahl (1997a) also reviewed the potential of the selected lands for other metallic and non-metallic minerals, including placer gold. This evaluation is summarized in Table 3-11.

3.2.2.4 Soils

The sediments that cover large portions of the project area are derived from the basalt, andesite, and rhyolite bedrock of the Gila Mountains. These sediments have been deposited on the broad Basin Fill terraces, in the ephemeral wash channels and floodplains, and on the rocky upper slopes that topographically characterize the project area. The Natural Resource Conservation Service (NRCS), formerly called the Soil Conservation Service (SCS), has identified and described the following soil types in each of the major topographic divisions (SCS 1970, 1981).

< **Lower Alluvial Fan Terraces.** On the lower terraces, sediments form level to gently sloping, broad, coalescent plains on bluffs overlooking the floodplain of the Gila River. This topography typifies the southernmost portion of the project area where the proposed compactible soil source area is located. These soil units in this area are all coarse-grained, containing and covered by large amounts of gravel. The soils tend to be deep. They are largely alkaline, particularly in the subsoils, and often have lime-cemented hardpan substrates. All the soils are well drained; permeability is very slow in the lime substrates, moderately slow in the Continental and Pinaleño soils, and moderately rapid to rapid in the Gravelly Alluvial Land. Available water holding capacity ranges from very low to moderate. All the soils present severe limitations for most recreational and building uses. Their suitability for roadfill ranges from poor to good; compaction characteristics are rated fair to good. Their suitability for top soil ranges from poor to fair (SCS 1970).

Table 3-11. Summary of Metallic and Non-Metallic Mineral Resource Potential on the Selected Lands

Mineral/Resource	Potential
coal, oil, gas, sodium, and potassium	not prospectively valuable
uranium and thorium	low potential
geothermal resources	portions considered favorable for development of low-temperature geothermal resources
non-metallic and industrial minerals (e.g., limestone, sandstone)	not known to exist in commercial quantities
common variety minerals (e.g., sand, gravel, decomposed organic, riprap rock, clays)	localized deposits present
placer gold and all other metallic minerals	low potential

Source: Wahl 1997a.

< **Upper Alluvial Fan Terraces.** The upper alluvial fan terraces typify the middle reaches of the project area in a band stretching diagonally from the northwest to the southeast. Several major components of the proposed mining activity will be located on these terraces. The soil units in this area contain and are often covered by coarse sediments: cobbles, gravel, and sometimes hardpan fragments. They tend to be deep in the lower reaches of the alluvial fans where the slopes are gentler, and shallow to very shallow in the upper reaches where the slopes are steeper. The soils, particularly the subsoils, are largely alkaline, with several units forming a substratum of silica- and lime-cemented hardpan at depths ranging from 40 inches in the Artesia series to two inches or less in the Orthents. All the soils are well drained; permeability is slow to moderately slow; available water capacity ranges from very low to moderate. All the soils present severe limitations for most recreational and building uses. Their suitability for roadfill ranges from poor to fair. Their suitability for top soil is uniformly poor. Their ability to support grasses is very poor; to support herbaceous plants and shrubs, generally fair; and to support rangeland wildlife habitat, poor to fair (SCS 1981).

< **Ephemeral Wash Beds and Floodplains.** Soil in this area has deposited in and alongside the numerous ephemeral washes that run diagonally across the project area and across both planned mining sites. This soil unit is deep and well drained. Permeability is rapid, and the available water capacity is very low to low (SCS 1981). Several facilities of the proposed mining activities will be located on patches of this soil type associated with Talley, Cottonwood, and Peterson Washes.

< **Rocky Upper Slopes.** Soil units in the rocky slopes, hills, and escarpments in the northeastern portion of the project area contain and are often covered by cobbles and gravel. They tend to be very shallow and shallow, with the exception of Limpia, which is deep. All the soils tend to be alkaline. They are well drained; permeability is slow to moderately slow; available water capacity ranges from very low to moderate. All the soils present severe limitations for most recreational and building uses. Their suitability for roadfill and topsoil is poor. Their ability to support grasses is very poor, and their ability to support herbaceous plants, shrubs, and rangeland wildlife habitat is fair to poor (SCS 1981).

3.2.2.5 Groundwater

The project area is located in the Gila sub-basin of the larger Safford groundwater basin. This sub-basin covers 1,642 square miles of the northwest-trending Safford Valley and the mountain ranges on either side. The Gila and Peloncillo mountains border the sub-basin on the northeast; the Pinaleño and Santa

Teresa mountains border on the southwest. Groundwater under the valley floor enters the Gila sub-basin from the southeast and exits to the northwest, following the same gradient as the Gila River on the surface. This through-flow is augmented by groundwater that drains down gradient from the mountains on both sides of the valley floor (Figure 3-9) (Dames & Moore 1997a).

In the immediate project area, groundwater generally flows from topographically high elevations in the Gila Mountains southwestward toward the valley floor. It moves through three hydrogeologic units that correspond to lithologic units. They are the 1) Safford Volcanic Unit, 2) Gila Mountain Volcanic aquifer, and 3) Lower Basin Fill aquifer (Figure 3-9). Outside and downslope from the project area on the Safford Valley floor, an additional unit, the Upper Basin Fill, overlies the Lower Basin Fill aquifer. In the project area, northeast of the Butte Fault, only the oldest hydrogeologic unit, the Safford Volcanic Unit, is present and available as a source of pumped groundwater. This unit contributes groundwater to both the Dos Pobres and San Juan pit sites. Southwest of the Butte Fault, in the graben between the Butte and Valley faults, the Gila Mountain Volcanic aquifer is the primary potential source of groundwater. It contributes groundwater to the Dos Pobres pit site but not to the San Juan pit site. The third aquifer, the Lower Basin Fill, is located primarily south-southwest of the Southwest Fault. It appears not to contribute to the Dos Pobres pit site, and definitely does not contribute to the San Juan pit site (ibid.).

To obtain data on groundwater and aquifer characteristics, 15 new monitor wells and 19 new piezometers (both in the AP-series) were installed in the project area during hydrogeologic field investigations conducted in 1995-1996 (Dames & Moore 1997a). These new wells joined 18 existing monitor wells in the project area (for a total of 33 monitor wells) and 19 existing piezometers (for a total of 38 piezometers) (Figure 3-10). From 1995-1998, 46 groundwater exploration wells (GI-series) were installed. The GI-series includes six pilot wells that were installed and tested to obtain data on aquifer characteristics, groundwater elevations, and drawdown characteristics (see Figure 3-11).

Aquifer characteristics including transmissivity, storativity, and hydraulic conductivity have been estimated from pumping test data (URS 2002a). The Safford Volcanics and the Gila Mountain Volcanics have both undergone aquifer characterization tests, but demonstrate highly variable transmissivity and storativity values depending upon the degree of fracturing in the well area. In general, the younger Gila Mountain Volcanics exhibit higher porosity/permeability and are more fractured than the older Safford Volcanics. The difference in hydraulic conductivity between the Safford Volcanics and Gila Mountain Volcanics indicates hydraulic connection between them is limited. In the project area, the Lower Basin Fill is not saturated and has not been tested. Table 3-12 presents aquifer characteristics in the project area.

Groundwater elevations in the project area are highest in the northeast where topographic elevations are highest, and lowest in the southwest where topographic elevations are lowest (see Figure 3-11 for the observed water table). Northeast of the Butte Fault, groundwater elevations range from 3,500 to 4,300 feet above mean sea level (msl), and southwest of the fault, they range from 3,000 to 3,500 feet above msl. In the graben, between the Butte and Valley faults, groundwater elevations range from 3,250 to 3,260 feet above msl. While the groundwater table in the project area tends to follow the topography, the distribution of areal recharge and the hydraulic conductivity (permeability) of the underlying aquifer materials strongly influences groundwater elevation and groundwater gradients, i.e., the ratio of vertical movement to horizontal movement (measured in feet per foot [ft/ft])(Dames & Moore 1997a).

Table 3-12. Aquifer Characteristics in the Project Area

Aquifer	Storativity (1/ft)	Transmissivity (ft^2/day)	Aquifer Thickness (ft)	Hydraulic Conductivity (ft/day)	Confined/ Unconfined
Safford Volcanic Unit (well GI-P3)	0.0005 - 0.17	1,000 - 6,000	600	13 - 70	confined

Gila Mountain Volcanic Aquifer (well GI-P2)	0.0004 - 0.03	5,000 - 40,000	1,200	33 - 254	semi-confined to confined
Lower Basin Fill Aquifer (well AP-27)	unknown	21,000 - 40,320,000	0 - $115	133 - 245	unconfined

Source: L. Person, Dames & Moore, pers. comm.

Northeast of the Butte Fault, areal recharge is higher in the Gila Mountains, and the Safford Volcanic Unit has low permeability; consequently, groundwater table gradients are relatively steep, ranging from 0.02 to 0.4 ft/ft. Depth to groundwater ranges from ground surface to several hundred feet below ground surface (bgs). Water levels are typically shallow near springs and seeps but range to greater than 700 feet bgs. Between the Butte and Valley faults, in the graben area, groundwater elevations are very consistent at approximately 3,255 feet above msl, varying with topography between roughly 600 and 750 feet bgs (Dames & Moore 1996b). South of the Southwest Fault, depth to groundwater is between approximately 100 and 500 feet bgs.

Recharge of groundwater in the project area occurs as infiltration of precipitation, with the greatest recharge occurring in the higher elevations of the Gila Mountains. The main area of groundwater recharge near the proposed mine sites is expected to occur along a major break in slope of the Gila Mountains located north of the pit sites. Annual precipitation is estimated to be more than 18 inches in the mountains and 12-15 inches in the project area (Dames & Moore 1996b). Areal recharge rate along the mountain front has been estimated to range from 0.115 in/yr in the higher portions of the Gila Mountains to as much as 1.90 in/yr along the mountain front where both precipitation and runoff from the mountains recharge fractured volcanic rocks and unconsolidated sediments (Dames & Moore 1997c). Water enters the groundwater system in the Safford Valley down-gradient of the mine from several sources. An estimated 4,871 af/yr enters from the Gila Mountains, 32,771 af/yr as lateral inflows of groundwater from adjacent basin areas, and infiltration of 40,094 af/yr from the Gila River (Dames & Moore 1997c).

Discharge of groundwater in the project area occurs naturally at four springs: Bryce Spring (located just outside the northern boundary, but its discharge flows into the project area) and Hackberry, Cottonwood, and Walnut springs (all within the project area) (see Figure 3-1). There are 120 wells in the project area, but they are used only for groundwater measuring, sampling, and exploration, and do not discharge significant quantities of water. Discharge of groundwater in the Safford Valley from the Lower Basin Fill aquifer occurs primarily as pumping for irrigation and seepage into the Gila River (Dames & Moore 1997a). Surface flow diversion is not sufficient to irrigate all the crops grown, and so groundwater is pumped from wells for direct irrigation as well as directly into the canals distributing the surface diversion. Considering that the irrigated crops consumptively use 153,000 af/yr (94,789 gpm), and 100,000 af/yr (61,954 gpm) is supplied by diversions from the Gila River, the estimated net groundwater withdrawal for irrigation is 52,683 af/yr (32,639 gpm) (Dames & Moore 1997c). The estimated outflow from the groundwater system to the Gila River is 21,161 af/yr (13,110 gpm), and an additional groundwater outflow to the northwest (Figure 3-9) of 3,697 af/yr (2,290 gpm), comprise the remainder of the outflows from the groundwater system (Dames & Moore 1997c).

3.2.2.5.1 Groundwater Quantity. The volume of groundwater moving through the area tapped by new and existing pilot-wells[12] is estimated to be approximately 4,570 af/yr (URS 2002a). This groundwater is not uniformly distributed throughout the rock mass but moves through discrete fractures; therefore, only a portion of this groundwater is available to any given well.

Constant rate pump testing was conducted at the four pilot-wells to determine drawdown of the aquifer. Three of the four wells were tested concurrently (Dames & Moore 1997c). Drawdown pumping from wells

[12] As calculated using the Darcy equation.

GI-P1, GI-P2, and GI-P4 appears to be confined by the Butte and Valley faults, which act as no-flow boundaries. The maximum spread of the cone of depression from GI-P3 after roughly 4.5 weeks of continuous pumping at 2,000 gpm (3,228 af/yr) is approximately 8,500 feet to the west-southwest. Spread of the cone of depression (i.e., drawdown) appears to be limited by the Valley Fault to the north, and, possibly, by the Southwest Fault to the south. The average production rate from each pilot-well through October 31, 1996, is provided in Table 3-13.

Table 3-13. Average Groundwater Production Rate from Four Pilot-Wells in the Project Area

Pilot well	Discharge Rate (gpm)	Drawdown (ft)	Pumping Period (weeks)
GI-P1	900 (1,453 af/yr)	21	2.44
GI-P2	2,000 (3,228 af/yr)	125	18.60
GI-P3	2,000 (3,228 af/yr)	204	4.46
GI-P4	3,200 (5,165 af/yr)	96	6.35

Source: Dames & Moore 1997b.

3.2.2.5.2 Groundwater Quality. Dames & Moore (1997a) collected groundwater quality data from 32 monitor wells in the project area, and from three springs (Bryce, Hackberry, and Cottonwood springs). The objectives of water quality testing were to assess the availability of groundwater of suitable quality for use in the proposed mining operations (i.e., groundwater with a chloride concentration of less than 200 mg/L), and to provide data for environmental analysis. These data will serve as a baseline to project, and later measure, any effects of the proposed mining activities on groundwater quality.

Groundwater quality varies significantly throughout the Safford Basin. Water quality in the Floodplain Alluvial aquifer in the center of the Safford Valley is poor, generally declining from east to west. Electrical conductivity (proportional to total dissolved solids [TDS]) varies from 2,000 µmhos near Solomon to 8,000 µmhos near Pima. Chloride concentrations vary from 400 ppm to 1,600 ppm over the same area. Groundwater quality in both the Floodplain Alluvial aquifer and the Upper Basin Fill is influenced by upward leakage from the artesian Lower Basin Fill aquifer and by downward percolation of irrigation water. The Lower Basin Fill aquifer is high in TDS and elevated in temperature. Few wells penetrate this unit due to its poor water quality.

Groundwater quality generally improves toward the mountains on both sides of the valley. Water quality differs between the northeastern and southwestern parts of the project area, with the inferred Southwest Fault appearing to act as a divide for groundwater quality. Northeast of the Southwest Fault, groundwater is drawn from either the Safford or the Gila Mountain Volcanics, where water quality is generally good. The inorganic geochemistry of the groundwater tends to be characterized by sodium/potassium and carbonate/bicarbonate, with a relatively low total ion content. Fluoride concentrations generally are less than 1.0 mg/L. Observed concentrations of TDS, sulfate, and chloride are also comparatively low. TDS concentrations typically range from about 250 to 1,000 mg/L, but are generally less than 500 mg/L. Sulfate concentrations typically range from nondetectable (>5 mg/L) to more than 800 mg/L but are generally less than 300 mg/L. Chloride concentrations range from 5 mg/L to as high as 450 mg/L, but are generally less than 200 mg/L. Compared to the Gila Mountains Volcanics, the Safford Volcanics has a slightly higher sulphate content but lower calcium and magnesium concentrations.

Southwest of the Southwest Fault, where the Lower Basin Fill is the principal aquifer, groundwater is dominated by sodium/potassium, and, to a lesser extent, sulfate. Ion composition of groundwater in the Lower Basin Fill is markedly different from that of the volcanics. Total ion content is relatively high. Fluoride concentrations in groundwater from five monitor wells in the area range from 4.2 to 8.6 mg/L, exceeding the numeric Aquifer Water Quality Standard (AWQS) of 4.0 mg/L. Observed concentrations of TDS, sulfate, and chloride are also comparatively high. TDS concentrations range from about 1,100 to 2,400 mg/L, sulfate concentrations range from 220 mg/L to 4300 mg/L, and chloride concentrations range from 450 mg/L to 1,200 mg/L. Groundwater conditions throughout the project area are alkaline, with laboratory pH values ranging between 6.4 and 12.1. Values from all but one well were greater than 7.0 and most values ranged between 7.0 and 9.0 (alkaline).

Seven metals with numeric AWQS were detected in groundwater in the project area: arsenic, barium, cadmium, chromium, lead, mercury, and nickel (Table 3-14). Only nickel exceeded the numeric AWQS (0.1 mg/L), with a concentration of 0.12 mg/L in one of three samples from a single well. The concentration was 0.09 mg/L in the second sample, and no nickel was detected in the third sample. The other metals detected in the groundwater in the project area (aluminum, copper, iron, manganese, silicon, and zinc) do not have numeric AWQS.

Concentrations of nitrite exceed the numeric AWQS (1 mg/L, as N) in samples from two wells (2.0 to 2.4 mg/L, as N). Concentrations of nitrate, as total nitrate and nitrite, do not exceed the numeric AWQS. Cyanide was detected in groundwater from three wells, but at concentrations (0.01, 0.01, and 0.03 mg/L) well below the numeric AWQS (0.2, as free cyanide). Low concentrations (< 2.5 mg/L) of total petroleum hydrocarbons (TPH) were detected in samples from four wells. Most concentrations of total organic carbon (TOC) range from nondetectable to 7.8 mg/L, and are typically below less than 5.0 mg/L. Samples from six wells range between 13 and 110 mg/L for TOC. Gross alpha particle activity values range from 0 to 23 picocuries per liter (pCi/L), and samples from two wells exceeded the AWQS (15 pCi/L). Gross beta particle activity values range from 0 to 240 picocuries per liter (pCi/L), but are typically less than 10 pCi/L, and exceed the AWQS (15 pCi/L) in samples from two wells. Values for radium 226 and radium 228 are below the numeric AWQS of 5 pCi/L.

Several wells in the project area demonstrated elevated water temperatures; however, the distribution of warm water in the project area does not appear to correlate with high TDS, fluoride, or sulfate (Dames & Moore 1998) and the geochemistry between these wells is distinct. For example, well GI-T18 (northwest of the Dos Pobres pit) has a temperature of 110°F and a TDS value of 280 mg/l and well AP-37 (along Cottonwood Wash south of the Dos Pobres pit) has a temperature of 98°F and a TDS value of 1600 mg/l. Groundwater in the area of the San Juan deposit is dominated by sulfate and is geochemically distinct from water in other parts of the project area (Dames & Moore 1997c); no elevated temperatures were observed in wells in this area. Previous studies conducted in the area of the Lone Star deposit located a borehole with highly mineralized thermal water with a temperature of 150°F and a TDS value of 4,555 mg/l. The borehole is probably associated with the Butte Fault. Thermal artesian waters encountered in wells such as at Watson Wash, located more than six miles southwest of the Dos Pobres mine, result from the presence of a thick clay layer in the upper part of the Lower Basin Fill. This geological stratum is not present at or below the water table elevation in the vicinity of the Dos Pobres mine.

Table 3-14. Metals with Numeric AWQS Detected in Groundwater in the Project Area

Metal	Numeric AWQS (mg/L)	Number of Wells with Detections	Number of Wells with Analytical Results That Exceed the Numeric AWQS
Arsenic	0.05	10	0
Barium	2.0	23	0
Cadmium	0.005	3	0
Chromium	0.1	9	0
Lead	0.05	4	0
Mercury	0.002	1	0
Nickel	0.1	1	1

Source: Dames & Moore 1997a.

3.2.2.6 Surface Water

The project area lies within the middle-Gila River watershed. The City of Safford does not draw water from the Gila River for municipal or industrial uses, depending instead on Bonita Creek, a tributary whose confluence is located approximately 16 miles upstream of Safford. The Bonita Creek watershed is separated from the project area by a ridge of the Gila Mountains.

The project area itself is drained by more than 150, primarily unnamed ephemeral washes (SWCA 1997e). Most of smaller washes feed into ten larger, named washes: Butler, Coyote, Watson, Talley, Cottonwood,

Peterson, Wilson, Lone Star, Tidwell, and Big Canyon Wash. Because Coyote Wash is tributary to Butler Wash, and Cottonwood Wash is tributary to Peterson Wash, these two drainage systems will often be referred to in this document as Coyote/Butler Wash and Cottonwood/Peterson Wash, respectively. The largest single wash is Peterson Wash, which runs just west of the proposed San Juan pit. Drainages in the project area run generally from the northeast toward the southwest, ultimately flowing into the Gila River about seven miles downslope (see Figure 3-1). The lower elevations of the project area, in which there is little topographic variation, are particularly subject to sheet flows, a phenomenon in which surface runoff flows in wide, shallow sheets rather than in channels.

The only other surface water in the project area comes from four isolated springs: Bryce Spring, Hackberry Spring, Cottonwood Spring, and Walnut Spring (Figure 3-1). The head of Bryce Spring is actually located just to the north of the project boundary, but its flow runs into the project area. Flows in each of these springs does not reach the Gila River but is used locally for watering stock. Bryce and Walnut springs are located on BLM lands and Hackberry and Cottonwood springs are located on PD patented land; all have been developed for stockwatering purposes.

3.2.2.6.1 Surface Water Quantity. Annual precipitation is estimated to vary from 9.8 inches in the City of Safford to more than 18 inches in the higher Gila Mountains (Dames & Moore 1996b). Precipitation in the project area is estimated to be 12-15 inches per year (ibid.). About half of this falls as light winter showers; the other half falls during summer thunderstorms. Summer high temperatures range between 100 and 115°F and winter lows range between 10 and 20°F (Dames & Moore 1997a).

The Gila River is the only perennial stream in the immediate vicinity, flowing through the Safford Valley at an annual average discharge of 477 cfs (about 345,000 af/yr), with a lowest annual mean of 101 cfs (79,500 af/yr) in 1951 and highest annual mean of 2,229 cfs (1,610,900 af/yr) in 1993 (USGS 1996). Consumptive use of water in the Safford Valley for agriculture is estimated to be about 153,000 af/yr, which is provided through river diversions and groundwater pumping (H. West, BLM, pers. comm.). This annual total water use represents nearly 44% of the average annual discharge of the Gila River. Surface flows in the Gila River have been allocated based on a system of priority surface water rights, which is currently subject to an ongoing adjudication in Maricopa County Superior Court.

The U.S. Geological Survey (USGS) reports that average annual runoff in the vicinity of the project area is approximately 0.2 inches.[13] Dames & Moore, in studying data from four gaging stations in the study region, calculated that the average annual runoffs for local watersheds in the project area is 0.22 inches for those areas below 5,000 feet elevation and 0.42 inches for areas above 5,000 feet (Dames & Moore 1996a). The difference between precipitation and runoff is attributable to infiltration and evapotranspiration. The estimated average annual runoff in the six largest washes in the project area is reported in Table 3-15 (Dames & Moore 1998).

3.2.2.6.2 Surface Water Quality. In *1996 Arizona Water Quality Assessment* [commonly referred to as the 305(b) report] (ADEQ 1996), surface water quality data are presented for 12.6 miles of the Gila River directly downstream from the project area, from the San Simon River to Peck Wash. The project area is tributary to this segment of the Gila River watershed. Based on a USFWS study conducted in 1990 of fish, water, and sediment contamination (King and Baker 1994), this segment of the Gila River was evaluated to be in "partial support"[14] of designated uses due to elevated levels of arsenic (in water), cadmium and thallium (in sediment), and copper and zinc (in fish). This segment is not classified as

[13] Runoff is reported here as the depth of water that would uniformly cover the entire area of interest.

[14] Water bodies are assessed to be in "partial support" of designated uses if one or more uses are impaired, but none substantially. Narrative violations may occur seasonally (e.g., excessive algal blooms or weeds), and toxic spills or discharges may occur with nominal or short-term effects (ADEQ 1996).

"Water Quality Limited."[15]

The average annual sediment yield in af/yr is reported for the five largest washes in the project area in Table 3-16.

Table 3-15. Average Annual Runoff Volume (af) for Six Washes in the Project Area

Butler Wash	Watson Wash	Talley Wash	Cottonwood/ Peterson Wash	Wilson Wash	Lone Star Wash
264	137	119	252	80	130

Source: Dames & Moore 1998f.

Table 3-16. Average Annual Sediment Yield (af/yr) for Five Washes in the Project Area

Butler Wash	Watson Wash	Talley Wash	Peterson Wash	Wilson Wash
0.9	2.9	1.3	1.5	3.0

Source: Dames & Moore 1996a.

3.2.2.6.3 Pit Lakes. Lakes form in mine pits from three sources: precipitation, surface runoff, and groundwater inflow through fractures in the rock walls. Water is lost from such lakes through evaporation and groundwater seepage. Water quality in a pit lake is a function of the quantity and quality of influent solutions, wallrock mineralogy, and chemical reactions within the lake. The water derived from high wall runoff flowing into a pit carries a dissolved mineral load resulting from weathering and oxidation of surface outcrops of mineralized rocks.

A small lake has formed in the existing San Juan pit, covering roughly seven percent of the pit surface (Water Management Consultants, Inc. 1997). Walls of the pit exposed above the lake surface are composed of alluvial cover (8 percent), Safford Volcanics (45 percent), and quartz monzonite porphyry (roughly 46 percent). Of these rocks, 7 percent are unmineralized and 93 percent are oxides. Acid-base accounting results for the rocks show that they are generally non-acid generating; in fact, they have a net neutralizing capacity (PDSI 1996; Water Management Consultants, Inc. 2002). This can be attributed to the absence of sulfides, the oxidation of which is the main source of acid rock drainage from mine workings.

In EPA 1312 testing to model characteristics the ultimate San Juan pit lake, the leachate derived from rocks in the wall of the existing pit was determined to have a pH between 7.72 and 8.34 (alkaline) with low metal concentrations that meets BLM benchmark values (BLM 1996a, Water Management Consultants, Inc. 1997).[16] According to modeling results, the predicted water quality of the existing lake, through the natural mixing of runoff from the pit walls and groundwater, would be expected to have neutral to slightly alkaline pH levels and a dissolved metals load within BLM benchmark concentrations and AWQS (ibid.).

[15] "Water Quality Limited" water bodies are assessed as having impaired uses that require more than existing technology and permit controls to achieve or maintain water quality standards (ADEQ 1996).

[16] Data are inconclusive for thallium concentrations because the BLM benchmark is 0.002 mg/l, below the detection limit of 0.0025 mg/l. Thallium was not detected in the EPA 1312 testing of San Juan pit lake water; therefore, concentrations fell below 0.0025 mg/l. Whether they also fell below 0.002 mg/l, the BLM benchmark, cannot be determined.

The average measured pH (3.0), however, is much more acidic than the predicted value, and concentrations of aluminum (193 mg/L), copper (827 mg/L), iron (46 mg/L), manganese (109 mg/L), nickel (1.5 mg/L), zinc (21 mg/L), and sulfate (10,500 mg/L) are dramatically higher than predicted by several orders of magnitude. Other metal concentrations show no significant enrichment compared to predicted values. This inconsistency suggests the current lake chemistry is being determined by sources other than those considered in the modeling (groundwater and runoff from pit walls). The source of the acid and heavy metal enriched water is likely historic leaching next to the existing San Juan pit. Surface water runoff into the pit likely includes acid leachate derived either from former leaching operations near the pit or from dissolution of residual products of previous leaching from the spent ore piles.

The water chemistry of the existing San Juan pit lake exceeds BLM benchmark levels for aluminum (21 mg/L), copper (1.1 mg/L), manganese (0.78 mg/L), and zinc (0.834 mg/L). It also exceeds AWQS for nickel (0.10 mg/L) (Water Management Consultants, Inc. 1997).

3.2.2.6.4 100-year Floodplains. One-hundred year floodplains are delineated by the Federal Emergency Management Agency (FEMA). FEMA has not determined base flood elevations or flood hazard factors for the reach of the Gila River south of the project area nor for the upstream portions of the major drainages that traverse the project area (FEMA 1984).Only portions of Watson, Talley, Cottonwood, Peterson, Wilson, and Lone Star Washes, as shown on Figure 3-12, have been delineated as Zone A floodplains (areas of 100-year flood for which the base flood elevations and flood hazard factors have not been determined).

3.2.2.6.5 Waters of the United States. Waters of the United States are defined in the Clean Water Act as “surface waters, including streams, streambeds, rivers, lakes, reservoirs, arroyos, washes, and other ephemeral watercourses and wetlands” (COE 1993). Waters of the United States (waters) on the project area, both on private and public lands, are under the jurisdiction of the COE, and activities that result in impacts to waters must be permitted by the COE under Section 404 of the Clean Water Act (see “Decisions to be Made” section in Chapter 1, Section 1.4.1). The COE also has regulatory authority over jurisdictional wetlands. Within an approximately 16,625-acre study area that includes the area proposed for mining, 113.92 acres of waters and 0.03 acres of wetlands were delineated as jurisdictional (SWCA 1997e).

< **Ephemeral Washes.** One-hundred-fifty-nine (159) ephemeral washes occurring on the study area were investigated as possible waters of the United States. Of these, 100 washes, ranging from large, named drainages with multiple braided channels, such as Peterson Wash, to smaller, unnamed, single-channel tributaries, were delineated. No perennial streams or reaches occur on the study area. The total area of jurisdictional waters on the project area is 113.92 acres.

< **Jurisdictional Wetlands.** To be a jurisdictional wetland, an area must meet three criteria: the presence of vegetation dominated by hydrophytic species, hydric soil conditions, and wetland hydrology. Four perennial springs and one seep occurring on the study area were investigated as possible jurisdictional wetlands: Bryce Spring, Hackberry Spring, Cottonwood Spring, Walnut Spring, and DP Seep. Portions of Bryce Spring and Cottonwood Spring met wetlands criteria and were delineated as jurisdictional wetlands. These two habitats are described below. The total area of jurisdictional wetlands on the project area is 1,178 square feet (0.03 acres).

In some cases, wetlands are disturbed by cattle grazing and stock watering use. In such situations, the lack of any given wetlands criteria must be evaluated in light of these circumstances.

C **Bryce Spring Wetland.** The head of Bryce Spring is located on BLM lands (see Figure 3-1) and lies within a small drainage at the northern end of the study area. Several small, shallow, bedrock pools are located about 0.75 mile downstream of the spring on PD property. These pools are inundated, have shallow soils exhibiting hydric conditions, and are vegetated with emergent species such as water speedwell (*Veronica anagallis-aquatica*), monkey-flower (*Mimulus guttatus*), pondweed (*Zannichellia palustris*), rabbitfoot

grass (*Polypogon monspeliensis*), and deergrass *(Muhlenbergia rigens*). The total jurisdictional area of these pools is estimated to be 1,078 square feet. Use of this area by cattle is evident by the close cropping of deergrass and rabbitfoot grass in accessible areas.

C **Cottonwood Spring Wetland.** The jurisdictional wetland at Cottonwood Spring consists of a small, shallow, apparently human-made pool (approximately 100 square feet and 8-12 inches deep) fed by a broken spring box on a small ridge above Cottonwood Wash. Water from the spring box flows in a small trickle into the pool, which contains emergent vegetation such as water speedwell *(Veronica anagallis-aquatica*) and cattail (*Typha* sp.). Adjacent to the pool are a single medium-sized cottonwood tree (*Populus fremontii*), a Goodding willow tree (*Salix gooddingii*), and several small seep-willows (*Baccharis salicifolia*); a small thicket of cottonwood saplings grows nearby. Cottonwood Spring is located entirely on PD property. The total jurisdictional area of this pool is estimated to be 100 square feet. Cattle graze and trample the area when they come to water.

3.2.3 Biological Resources

3.2.3.1 Vegetation

Four major upland plant communities and two riparian plant communities were identified in the project area (SWCA 1997a). All are common and widespread in the Southwest. The plant community classification used here follows Brown, Lowe, and Pase (1979).

3.2.3.1.1 Upland Plant Communities. The upland plant communities identified in the project area are 1) Sonoran Desertscrub, 2) Semidesert Grassland, 3) Sonoran Desertscrub/Semidesert Grassland ecotone, and 4) Disturbed Land. With the exception of disturbed land, each of these biotic communities in the project area succeeds the next in a progression from the southwest to the northeast, following general changes in elevation, topography, and soil (Figure 3-13). Generally, each biotic community grades gradually into the next, making depicted limits necessarily somewhat arbitrary. Similarly, species dominance and plant densities vary with local topography and exposure. Each biotic community is described below.

< **Sonoran Desertscrub.** This biome occurs on the bajada (gently sloping alluvial fans) at lower elevations in the southern reaches of the project area and on some of the south-facing slopes along the lower foothills of the Gila Mountains. It covers approximately 25,278 acres (49 percent) of the 51,930-acre study area that encompasses the project area (SWCA 1997a). In the study area, particularly on the bajada, this community is heavily dominated by creosotebush (*Larrea tridentata*). Although creosotebush also is dominant on foothill slopes, it is less abundant there and plants are more widely spaced than on the bajada. Other species commonly observed in this biome include ocotillo (*Fouquieria splendens*), blue paloverde (*Cercidium floridum*), mesquite (*Prosopis juliflora*), prickly pear (*Opuntia phaeacantha* and *O. chlorotica*), snakeweed (*Gutierrezia sarothrae*), catclaw acacia (*Acacia greggii*), banana yucca (*Yucca baccata*), barrel cactus (*Ferocactus wislizenii*), and devil's club cholla (*Opuntia stanlyi*). A few areas on the bajada show evidence of past disturbance, possibly from former cattle or mining operations. Mesquite, blue paloverde, and snakeweed are dominant in these areas.

< **Semidesert Grassland.** This open plant community, dominated by snakeweed and grasses with generally widely scattered shrubs and trees, occurs in the northwestern corner of the study area where elevations are highest and the terrain steepest and rockiest. It occupies approximately 9,958 acres (19 percent) of the 51,930-acre study area. Grasses include tobosa (*Hilaria mutica*), sand dropseed (*Sporobolus cryptandrus*), needle grama (*Bouteloua aristidoides*), sideoats grama (*Bouteloua curtipendula*), black grama (*Bouteloua eriopoda*), sixweeks grama (*Bouteloua barbata*), sixweeks threeawn (*Aristida adscensionis*), spidergrass (*Aristida ternipes*), tanglehead (*Heteropogon contortus*), bush muhly (*Muhlenbergia porteri*), and green sprangletop (*Leptochloa*

dubia). Shrubs and small trees include mesquite, Coahuila juniper (*Juniperus coahuilensis*), catclaw acacia, whitethorn acacia (*Acacia constricta*), scrub live oak (*Quercus turbinella*), banana yucca, soaptree yucca (*Yucca elata*), sotol (*Dasylirion wheeleri)*, beargrass (*Nolina microcarpa*), ocotillo, and prickly pear. On north facing-slopes and along some drainages at higher elevations on the northwestern part of the study area, a number of species typical of Interior Chaparral and Pinyon-Juniper Woodland, such as pinyon pine (*Pinus* sp.), juniper, canotia (*Canotia holocantha*), and scrub oak, are present. At a finer scale, some of these areas might be mapped as interior chaparral or Great Basin Conifer Woodland, but none of the areas is more than a few acres in size and many plants typical of Semidesert Grassland are present as well. Large areas of Great Basin Conifer Woodland are present just north of the study area.

< **Sonoran Desertscrub/Semidesert Grassland Ecotone.** Because of the gradual, relatively gentle change in elevation over much of the study area from the southwest to the northeast, the transition between creosotebush-dominated Sonoran Desertscrub and grass- or shrub-dominated Semidesert Grassland occurs over a relatively large area. Though this transition area could have been divided and the two parts grouped into either Sonoran Desertscrub and Semidesert Grassland, mapping the transition area as a separate community is more accurate. As one would expect, this area supports a mixture of species found in Sonoran Desertscrub and Semidesert Grassland. The only species of plant that appears to be more common in the transition area than in either the Sonoran Desertscrub or Semidesert Grassland is jojoba (*Simmondsia chinensis*), which occurs in dense patches on some north- and west-facing hillsides in the foothills of the Gila Mountains. Though the transition occurs gradually in many areas, relatively abrupt changes in vegetation occur in some places due to abrupt changes in elevation, exposure, and perhaps soil types. Sonoran Desertscrub/Semidesert Grassland Ecotone occupies approximately 16,157 acres (31 percent) of the 51,930-acre study area.

< **Disturbed Land.** Four sites formerly used for mining purposes are located within the study area (Figure 3-13). These sites include large bladed areas, development rock stockpiles, buildings, and abandoned mine equipment. They are largely unvegetated except for scattered Russian thistle (*Salsola iberica*) and other weedy species. Disturbed Land occupies approximately 521 acres (1 percent) of the 51,930-acre study area.

3.2.3.1.2 Riparian Plant Communities. Riparian plant communities identified in the study area include 1) Xeroriparian Mixed Scrub, associated with an ephemeral water supply, and 2) riparian vegetation, associated with perennial springs (SWCA 1997a). Xeroriparian habitats typically include plant species also found in adjacent uplands, but plants in xeroriparian habitats are typically larger and often occur in higher densities than those in adjacent uplands.

< **Xeroriparian Mixed Scrub.** This is the dominant riparian habitat type in the study area. Vegetation in Xeroriparian Mixed Scrub is similar to that found in adjacent uplands; therefore, Xeroriparian Mixed Scrub habitats are not depicted in Figure 3-13. The majority of Xeroriparian Mixed Scrub habitats in the study area are dominated by mesquite, catclaw acacia, whitethorn acacia, blue paloverde, and desert broom (*Baccharis sarothroides*). Seep-willow is locally common, and foothill washes occasionally contain desert hackberry (*Celtis spinosa*). Vegetation typically consists of well-spaced small trees along channel margins, with desert broom and seep-willow (*Baccharis salicifolia*) occasionally occurring as small isolated shrubs within channel margins. Two drainages in the northeastern-most portion of the study area, Bear Spring Canyon and Spring Canyon (see Figure 3-1), are dominated by scrub live oak. Codominants in these two drainages include Coahuila juniper, whitethorn acacia, and mesquite along channel margins, with scattered snakeweed and desert broom within channel margins.

< **Riparian Vegetation Associated with Perennial Springs and a Seep.** A variety of riparian vegetation types occur in association with four perennial springs and one seep in the study area: Bryce Spring, Hackberry Spring, Cottonwood Spring, Walnut Spring, and DP Seep (Figure 3-13). Bryce, Hackberry, Cottonwood, and Walnut Springs are naturally occurring, while DP Seep appears to be the result of past human activity. Because areas occupied by riparian vegetation in

the vicinity of these springs are so small, specific classification of plant communities in these areas was not warranted.

- **Bryce Spring.** This is a natural spring located in T5S, R26E, Section 20 on BLM land with flow entering onto PDSI private land. A series of pools occurring downstream in the drainage below the spring contain a variety of aquatic plants, including water speedwell (*Veronica anagallis-aquatica*), monkey-flower (*Mimulus guttatus*), pondweed (*Zannichellia palustris*), and rabbitfoot grass (*Polypogon monspeliensis*). These pools are located on PD private land. Along the lower reaches of the drainage, common plants include rabbitfoot grass, seep-willow, deergrass (*Muhlenbergia rigens*), and Goodding willow (*Salix gooddingii*). Less common species include blue paloverde, catclaw acacia, and whitethorn acacia. Use of this area by cattle is evident by the close cropping of deergrass and rabbitfoot grass in accessible areas.

- **Hackberry Spring.** This is a natural spring located in T5S, R26E, Section 27 on PDSI Land. The spring is located in a drainage, and water from the spring is piped into a metal tank for use by cattle. The drainage contains Bermuda grass (*Cynodon dactylon*), mesquite, netleaf hackberry (*Celtis reticulata*), and seep-willow, but no emergent vegetation. Seep-willow is relatively dense for approximately 200 yards below the spring.

- **Cottonwood Spring.** This is a natural spring located in T5S, R26E, Section 27 on PDSI. The spring originates on a hill where water fills a small shallow pool. A metal pipe carries water from the pool to a cement trough, located about 50-60 feet from the pool. The pool contains green algae and emergent wetland vegetation, including water speedwell and cattail (*Typha latifolia*) that have been grazed by cattle. A few cottonwood (*Populus fremontii*) saplings are present around the spring. In the drainage (Cottonwood Wash) adjacent to the spring is a stand of cottonwood trees, the largest of which is approximately 35 feet in height and has a diameter at breast height (dbh) of approximately two feet. Other species present in the drainage are netleaf hackberry, mesquite, seep-willow, and desert broom. Small cottonwood trees are present for approximately 75 yards down Cottonwood Wash from the spring.

- **Walnut Spring.** This is a natural seep located in a drainage in T5S, R26E, Section 26 on BLM-administered land. Shallow subsurface and surface water results in an approximately 70-foot stretch of the wash where vegetation differs from upstream and downstream portions and adjacent uplands. Shallow and exposed bedrock in the drainage bottom causes water to rise to the surface and flow as a slow trickle for approximately 275 feet before returning underground. Vegetation where surface water occurs and approximately 120 feet upstream of this area is dominated by Goodding willow and desert broom. Fremont cottonwood, mesquite, and seep-willow also occur in this stretch. Seep-willow and desert broom dominate for approximately 250 feet upstream of where the surface water begins.

- **DP Seep.** This feature, which is thought to be an artifact of past mining activity, is located in T5S, R26E, Section 27 on PD private land. Water seepage supports a hillside patch of seep-willow and Goodding willow ranging in height from 15 to 35 feet. A few small mesquites grow in the drainage directly below the seep. For the most part, however, the drainage bottom is devoid of vegetation, apparently as a result of cattle grazing. Wet conditions persist for approximately 100 feet down the drainage from the vicinity of the seep. Vegetation in this stretch is sparse, consisting primarily of seep-willow, desert tobacco (*Nicotiana trigonophylla*), and one large Goodding willow. Downstream of this area there are several large stands of dead seep-willow. The seep is situated directly downstream from inactive disposal areas and underground mine workings. The seep and vegetated area likely originated as a result of past mining activity directly up slope, and the source of water for this spring may be the overburden disposal area. It appears likely

that water collects in this area and is discharged into surrounding geologic features before resurfacing at the DP Seep. The relatively young age of the willow trees at the seep, and the presence of dead mesquite trees within the Goodding willow/seep-willow patch on the slope suggest a relatively recent origin for DP Seep.

3.2.3.2 Wildlife

Fourteen mammal species, thirty bird species, and eight reptile species within or near the project area observed incidentally during field work by SWCA (1997a) are listed in Table 3-17. These species are typical of Sonoran Desertscrub and Semidesert Grassland habitats in southeastern Arizona.

3.2.3.2.1 Game Species. Principal big game species known to inhabit the project area include mule deer (*Odocoileus hemionus*) and collared peccary (*Tayassu tajacu*). Mule deer and collared peccary densities in the vicinity of the project area are considered medium (4 to 7 per square mile and 1.5 to 3 per square mile, respectively) by the Arizona Game and Fish Department (AGFD). These density estimates are based on a combination of off-site wildlife survey data and estimated habitat capabilities rather than on site-specific population surveys. Mountain lions (*Felis concolor*) also are expected to occur. Gambel's quail (*Callipepla gambelii*) is the most abundant game bird, reaching relatively high densities within the project area according to the Arizona Game and Fish Department (AGFD). Wildlife densities in Xeroriparian Mixed Scrub habitats within the project area are expected to be similar to those in surrounding uplands.[17] However, small patches of relatively dense vegetation around springs likely support higher wildlife densities than surrounding uplands.

Table 3-17. Wildlife Species Observed in the Project Area

Mammals		
	Yuma antelope ground squirrel	*Ammospermophilus harrisii*
	Rock squirrel	*Spermophilus variegatus*
	Merriam kangaroo rat	*Dipodomys merriami*
	Cactus mouse	*Peromyscus eremicus*
	White-throated woodrat	*Neotoma albigula*
	Ringtail	*Bassaricus astutus*
	Coati	*Nasua nasua*
	Townsend's big-eared bat	*Plecotus townsendii pallescens*
	California leaf-nosed bat	*Macrotus californicus*
	Cave myotis	*Myotis velifer*
Birds		
	Red-tailed hawk	*Buteo jamaicensis*
	Golden eagle	*Aquila chrysaetos*
	Common barn-owl	*Tyto alba*
	Great horned owl	*Bubo virginianus*
	Lesser nighthawk	*Chordeiles acutipennis*
	Ladder-backed woodpecker	*Picoides scalaris*
	Western kingbird	*Tyrannus verticalis*
	Say's phoebe	*Sayornis saya*
	Common raven	*Corvus corax*
	Verdin	*Auriparus flaviceps*

[17] Because it is impractical to measure all wildlife, or even all vertebrate species, associated with a given habitat type, indirect measures of wildlife value utilizing habitat parameters are typically used to quantify or estimate habitat value. Vegetation volume is one such parameter. In the arid Southwest higher volumes of vegetation are typically associated with increases in available moisture and thus normally would correlate strongly with productivity. Strong correlations have been established between breeding-bird density and vegetation volume (Mills et al. 1991). During visits to the project area, bird species composition and densities in xeroriparian habitats were observed to be similar to those in surrounding upland habitats, and no bird species typically restricted to riparian habitats in Arizona were observed.

Table 3-17, continued. Wildlife Species Observed in the Project Area

	Canyon wren	*Catherpes mexicanus*
	Rock wren	*Salpinctes obsoletus*
	Cactus wren	*Campylorhynchus brunneicapillus*
	Loggerhead shrike	*Lanius ludovicianus*
	Canyon towhee	*Pipilo fuscus*
	Black-throated sparrow	*Amphispiza bilineata*
	Brown-headed cowbird	*Molothrus ater*
House finch	*Carpodacus mexicanus*	
	Greater roadrunner	*Geococcyx californianus*
Reptiles		
	Greater earless lizard	*Cophosaurus texanus*
	Round-tailed horned lizard	*Phrynosoma modestum*
	Common collared lizard	*Crotaphytus collaris*
	Side-blotched lizard	Uta stansburiana
Reptiles		
	Desert spiny lizard	*Sceloporus magister*
	Western whiptail	*Cnemidophorus tigris*
	Western diamondback rattlesnake	*Crotalus atrox*

Source: SWCA 1997a. Observations were incidental to fieldwork.

3.2.3.2.2 Non-Game Species. Non-game wildlife species observed in the project area are expected to be typical of the habitats present. No attempt was made to document all species occurring on the project area, but species observed incidental to fieldwork are listed in Table 3-17.

3.2.3.3 Special Interest Species

Special interest species include those species that are listed or being considered for listing as threatened or endangered by the USFWS (federal endangered, threatened, proposed, or candidate species; USFWS 1994, 1996); or that are given sensitive species status by the BLM; or that are considered Wildlife of Special Concern in Arizona (WSCA) by the AGFD. Federally listed and proposed species and their designated critical habitat receive protection under the Endangered Species Act of 1973, as amended (ESA). The BLM sensitive species are those species that are not on federal or state lists as endangered, threatened, candidate, or proposed, but are designated by the BLM State Director for special management consideration. LM sensitive species status does not confer legal protection on a species; however, it does identify species that may need special management consideration. Designation as a WSCA species is intended to guide management decisions that involve wildlife and habitat.

Sixty-eight special interest species have been identified by the above-mentioned agencies as potentially occurring in the project area (Table 3-18). The likelihood of that occurrence has been evaluated through records searches, habitat evaluation, and, where appropriate, field surveys (SWCA 1994, 1996b, 1997a, 1997d, 1997f). Results of the evaluations are summarized in Table 3-18. Species accounts for those species that are either known to occur or have potential to occur in the project area follows the table. These accounts incorporate status changes published in the most recent editions of Animal Candidate Review (67 FR 40657-40679).

No federally listed, proposed, or candidate species are known to occur in the project area, and none was observed there during field surveys. One listed species, the threatened bald eagle, may occasionally fly over the area while foraging and/or migrating. No habitat suitable for federally listed species is present in the project area, but potentially suitable habitat for the southwestern willow flycatcher, bald eagle, cactus ferruginous pygmy-owl, and yellow-billed cuckoo exists along the Gila River downslope of the project area to the south and southwest. Southwestern willow

flycatchers are known to nest along this reach of the Gila River, and yellow-billed cuckoos, a candidate species, and Gila chub, a proposed endangered species, have been documented at Bonita Creek, which is approximately 10 miles east of the project area. Gila topminnow, an endangered species, has been documented in Watson Wash downslope of the project area to the southwest. An endangered least tern (*Sterna antillarum*) was observed by SWCA biologists south of the project area along the Gila River on April 18, 1997 (G.S. Mills, SWCA, pers. comm.). However, least tern is considered an accidental visitor to southeastern Arizona; therefore, the Project is extremely unlikely to affect the species and it is not considered further (ibid.). (For information about critical habitat designations, see Section 3.2.3.3.3.)

Table 3-18. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species That Are Known to Occur		
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Cave myotis	*Myotis velifer*	SS
Common black-hawk	*Buteogallus anthracinus*	WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Longfin dace	*Agosia chrysogaster*	SS
Lowland leopard frog	*Rana yavapaiensis*	WSCA
Pima Indian-mallow	*Abutilon parishii*	SR
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Sonora sucker	*Catastomus insignis*	SS
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Townsend's big-eared bat	*Plecotus townsendii pallescens*	WSCA
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa* var. *ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS

Table 3-18, continued. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	*Scientific Name*	Status*
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Ferruginous hawk	*Buteo regalis*	WSCA
Fringed myotis	*Myotis thysanodes*	SS
Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Species That May Occur		

Table 3-18, continued. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	*Scientific Name*	Status*
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican garter snake	*Thamnophis eques*	WSCA
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern goshawk	*Accipiter gentilis*	WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Spikedace	*Meda fulgida*	T, WSCA
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Species Unlikely to Occur		
Arizona hedgehog cactus	*Echinocereus triglochidiatus arizonicus*	E, HS
Apache trout	*Onchorhynchus apache*	T, WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Arizona cliffrose	*Purshia subintegra*	E, HS
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, SS, WSCA
Little Colorado River sucker	*Catostomus sp.*	SS, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mt. Graham red squirrel	*Tamiasciurus hudsonicus*	E, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Peebles bluestar	*Amsonia peeblesii*	SS
Rosy boa	*Lichanura trivirgata*	SS
Roundtail chub	*Gila robusta*	WSCA
Sonoran desert tortoise	*Gopherus agassizii*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculata*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Wet canyon talussnail	*Sonorella macrophallus*	CA
White-faced ibis	*Plegadis chihi*	S
Likelihood of Occurrence is Unknown		

Table 3-18, continued. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	*Scientific Name*	Status*
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

Species known to occur in the project area include seven BLM sensitive species (California leaf-nosed bat, cave myotis, desert sucker, loggerhead shrike, longfin dace, Sonora sucker, and speckled dace), one species designated only as a WSCA (Townsend's big-eared bat), and one species (Pima Indian mallow) that is protected by the Arizona Native Plant Law.

Species that have some potential to occur within the project area include fourteen BLM sensitive species (Allen's big-eared bat, Arizona giant sedge, big free-tailed bat, canyon spotted whiptail, Chiricahua water scavenger beetle, long-legged myotis, fringed myotis, northern gray hawk, Maricopa tiger beetle, Mexican long-tongued bat, pocketed free-tailed bat, small-footed myotis, three-nerved scurfpea, and western burrowing owl) and six species designated only as WSCA by the AGFD (American peregrine falcon, common black hawk, ferruginous hawk, lowland leopard frog, Mexican garter snake, and northern goshawk). A life history account and habitat suitability evaluation are provided below for each special-interest species that is known to occur or has potential to occur within the study area.

3.2.3.3.1 Threatened and Endangered Plants

- **Hedgehog Cactus.** Hedgehog cacti (*Echinocereus* sp.) morphologically similar to Arizona hedgehog cactus (*Echinocereus triglochidiatus arizonicus*), a species listed as endangered in 1979 by the USFWS, were found within the northernmost portion of the project area (SWCA 1997a). The taxonomy of cacti in general and *Echinocereus* cacti in particular is complex and poorly understood. Benson (1982) provided a taxonomic treatment of *Echinocereus* in which he recognized six varieties of *E. triglochidiatus* occurring in Arizona. Although he provided no key to the varieties of *E. triglochidiatus*, he did present a table of "distinctive characters." Many of the "distinctive characters" listed by Benson vary widely, and the range of any single character in one variety frequently overlaps the range of the character in one or more other varieties. Overlaps in characters of some varieties, such as *E. arizonicus* and *E. neomexicanus*, are so extensive as to render individual plants from an unknown location unidentifiable. This situation is further complicated by more recent data which indicate that some of the "distinctive characters" listed from the type locality of *E. arizonicus* are in error. Since the 1997 surveys, morphometric studies of *E. arizonicus* and its allies (Baker, cited in USFWS 2002) verified that the hedgehog cacti within the project area are not the listed subspecies. Thus, this species is not considered further in this analysis.

No other threatened or endangered plants are known or are likely to occur within the action area.

3.2.3.3.2 Threatened, Endangered, Proposed and Candidate Animals. The following evaluations indicate the federal status as determined by the USFWS of each species potentially occurring in the project area, and states whether the AGFD has designated that species a Wildlife [species] of Special Concern in Arizona (WSCA). The designation WSCA, which identifies species whose occurrence in the State of Arizona is judged to be in jeopardy or potentially in jeopardy, is primarily intended to guide management decisions. In the following list, species are arranged by their federal status: endangered first, followed by proposed endangered, thenthreatened and candidate.

< **Bald Eagle** (*Haliaeetus leucocephalus*) is listed as threatened by the USFWS and as WSCA by the AGFD. Only a few bald eagles nest in Arizona, primarily along the Salt, Verde, and Bill Williams Rivers, but an estimated 200 to 300 birds winter in the State. Though most wintering birds are found near water or in grasslands in the White Mountains and along the Mogollon Rim, a few winter in southeastern Arizona. No suitable breeding or wintering habitat is present in the project area, but bald eagles may occur occasionally as visitors to the study area during migration or in winter. A small number of eagles may winter irregularly along the Gila River, Bonita Creek, and Eagle Creek.

< **Gila Chub** (*Gila intermedia*) was recently proposed as endangered by the USFWS and is listed as a WSCA by the AGFD. This small native fish occupies perennial creeks, cienegas, and small impoundments in the Verde, middle Gila, Santa Cruz, and San Pedro River drainages in central and southern Arizona. Gila chub is known to occur in Bonita Creek, a tributary to the Gila River that is approximately 10 miles east of the project area (B. Robles, BLM, pers. comm. 1997) Bonita Creek is included in proposed designated critical habitat for the Gila chub, but no suitable habitat for the species exists within the project area.

< **Gila Topminnow** (*Poeciliopsis occidentalis occidentalis*) is listed as endangered by the USFWS and as WSCA by the AGFD. Once abundant and widely distributed in low- and mid-elevation streams throughout the Gila River system, this small fish is now found only at isolated locations where it has persisted or been reintroduced. Because of the lack of any significant water, habitat for this species is not present within the project area. However, a small, introduced population of this species has been observed less than a mile from the edge of the project area in waters originating from a hot artesian well in Watson Wash near its confluence with the Gila River. Since 1999, mosquito fish (*Gambusia affinis*), a non-native competitor of the topminnow, has been detected at the site, and the Gila topminnow has not been detected there during the last two annual surveys (B. Robles, BLM, pers. comm. 2002).

< **Loach Minnow** (*Meda fulgida*) is listed as threatened by the USFWS and as WSCA by the AGFD. This small fish inhabits fast flowing portions of moderate to large perennial streams. The species was once abundant throughout most of the Gila River drainage, but presently populations are present only in portions of the middle Gila River, lower San Pedro River, Aravaipa Creek, Eagle Creek, and the Verde River. Because of the lack of any significant water, habitat for this species is not present within the project area. East of the project area, however, designated critical habitat for the species includes portions of the Gila River and Eagle and Bonita Creeks (65 FR 24328-24372).

< **Razorback Sucker** (*Xyrauchen texanus*) is listed as endangered by the USFWS and as WSCA by the AGFD. Razorback sucker formerly occupied all the larger streams in the Gila River basin including the mainstream Gila River and possibly Eagle Creek. Razorback sucker is believed to have been extirpated from the Gila River early in this century. Despite reintroductions into the Gila River and Eagle Creek between 1981 and 1989 (Hendrickson 1993), it appears doubtful that this species is currently present. An aquatic survey of the Gila River through the Safford Valley by BLM and AGFD in 2001, conducted using electroshocking and seining techniques, produced no razorback suckers or any other special status fish species (B. Robles, pers. comm. 2002). Nonetheless, designated critical habitat for the razorback sucker in Arizona includes the Gila River from the Arizona-New Mexico border to Coolidge Dam, including the Gila River just south of the project area (USFWS 1993). No suitable habitat for razorback sucker or any other fish occurs in the project area.

< **Southwestern Willow Flycatcher** (*Empidonax traillii extimus*) is listed as endangered by the USFWS and as WSCA by the AGFD. This small flycatcher is present in Arizona only during the nesting season. Nesting habitat is usually dominated by dense stands of willow (*Salix* spp.), tamarisk (*Tamarix ramosissima*), button bush (*Cephalanthus occidentalis*), or Fremont cottonwood exhibiting very high total vegetation volume up to at least 13 feet, with or without an overstory. No riparian habitat suitable as nesting habitat for this species exists within the project area.

Though it is extremely unlikely that southwestern willow flycatcher occurs regularly in the project area, the species is known to nest at several sites along the Gila River south of the project area. Three territorial male southwestern willow flycatchers and one nest were found along the Gila River south of the project area near the Solomon Bridge east of Safford in May 1995. In 1996, SWCA biologists surveyed potentially suitable habitat for southwestern willow flycatcher along the Gila River from the Solomon Bridge downstream to the confluence with Watson Wash, a stream distance of approximately 10 miles. They located willow flycatchers in two additional areas (SWCA 1996b). In the first location (Patch #3), approximately one mile west of the Solomon Bridge, they detected two to three singing willow flycatchers on each of three visits (June 12, 20, and 26). According to Troy Corman of the AGFD, this same area was monitored in 1996 by biologists from the National Biological Survey, who located four pairs of flycatchers. At the second location (Patch #11), approximately one mile northeast of Thatcher, SWCA biologists detected two southwestern willow flycatchers and found a nest (ibid.).

In a survey conducted in May-July 1997, from the Solomon Bridge to just west of the Pima Bridge, biologists were unable to resurvey Patch #3 because the landowner withheld permission, and they detected no flycatchers in Patch #11 (SWCA 1997f). However, southwestern willow flycatchers were found at three additional locations. In a riparian patch on the south side of the Gila River about 0.75 mile west of the Watson Wash confluence, approximately 18-20 flycatchers were heard singing on May 29-30, June 19, and July 1. Just across the river, in Patch #20, biologists detected one flycatcher on May 29; six-ten flycatchers on June 19; and one nest on July 1. Farther downstream, about 0.25 mile east of Pima Bridge (Patch #29), biologists detected two flycatchers on May 28; six-eight flycatchers on June 19; and three on July 1 (SWCA 1997f). In 1998, five flycatchers were detected at the Fort Thomas mitigation site, two at the Pima mitigation site, and two at the Solomon mitigation site. Subsequent surveys of the Pima mitigation site detected 15 flycatcher territories in 2000 and 36 flycatcher territories in 2001 (USFWS 2002).

- **Spikedace** (*Tiaroga cobitis*) is listed as threatened by the USFWS and as WSCA by the AGFD. This small bottom-dwelling fish inhabits shallow riffles in moderate to large perennial streams. The species was once common throughout much of the Gila River drainage, but presently only isolated populations exist in portions of the White River, Black River, Aravaipa Creek, San Francisco River, Blue River, and Campbell Blue Creek. Because of the lack of any significant water, habitat for this species is not present within the project area. East of the project area, however, designated critical habitat for the species includes portions of the Gila River and Eagle and Bonita Creeks (65 FR 24328-24372).

- **Yellow-billed Cuckoo** (*Coccyzus americanus)* is listed as a candidate species by the USFWS. In Arizona, this cuckoo nests primarily in well-developed riparian woodlands. In the project area, riparian woodlands near springs are too small to be suitable. Suitable woodlands are present, however, along parts of the Gila River south of the project area and to the east along Bonita and Eagle Creeks. The species has been documented along Bonita Creek (B. Robles, BLM, pers. comm. 2002).

3.2.3.3.3 Critical Habitat. No proposed or designated critical habitat for any listed or proposed threatened or endangered species occurs within the project area. However, designated critical habitat for the razorback sucker (endangered) in Arizona includes the Gila River from the Arizona-New Mexico border to Coolidge Dam, including a reach of the river just south of the project area (58 FR 6578-6597). USFWS recently designated critical habitat for two threatened species of native fish, loach minnow and spikedace, in reaches of Bonita Creek and the Gila River upstream of their confluence[18] (65 FR 24328-24372), and in other river segments in Arizona and New Mexico. Additionally, the recent proposal to list Gila chub as an endangered species included Bonita Creek as proposed critical habitat (67 FR 51948-51985).

3.2.3.3.4 BLM Sensitive Species and Wildlife Species of Concern in Arizona. Sensitive species are those species designated by the BLM State Director, in cooperation with a state agency responsible for managing the species, as sensitive. Such species may include 1) species under status review by the USFWS/National Marine Fisheries Service; 2) species whose numbers are declining so rapidly that federal listing may become necessary; 3) species with typically small and widely dispersed populations; or 4) species inhabiting ecological refugia or other

[18] Specifically, critical habitat for these two species in the Gila River extends from a point about 3 miles below the confluence (Brown Canal diversion) upstream into New Mexico. Critical habitat in Bonita Creek extends from the confluence upstream about 14.6 miles.

specialized or unique habitats. The following sensitive species were evaluated because they have the potential to occur in the region that includes the project area.

< **Allen's (Mexican) Big-eared Bat** (*Idionycteris phyllotis*) is a BLM sensitive species but is not listed by the AGFD. Summer records of this bat in Arizona are mostly from Ponderosa Pine Forest, Pinyon-Juniper Woodland, Madrean Evergreen Woodland, and Mohave Desertscrub. Nursery and maternity colonies are known from mine tunnels and caves. This bat is not known from the project area; the nearest known locality is near Klondyke, approximately 40 miles to the west (Hoffmeister 1986). This species is unlikely to occur regularly in the project area, though it may visit occasionally.

< **American Peregrine Falcon** (*Falco peregrinus anatum*) is listed by the AGFD but is not a BLM sensitive species. Probably the most important breeding habitat requirement of this species is the presence of tall cliffs (typically over 150 feet but sometimes as low as 60 feet), which serve both as nesting and perching sites. In Arizona, breeding activity was documented at 206 locations in 1995. Known peregrine nest sites are located more than 15 miles southwest and 15 miles north/northeast of the project area in the Pinaleño Mountains and along Eagle Creek, respectively (L. Ward, AGFD, pers. comm. 1994).

Cliffs and rock outcrops within the project area are not suitable for nesting by peregrine falcons, and there are no known nest sites within 10 miles. Despite the absence of nearby nest records, it is possible that peregrine falcons occasionally visit the project area to forage. If so, they are not expected to occur regularly.

< **Arizona Giant Sedge** (*Carex spissa* var. *ultra*) is a BLM sensitive species. This wetland plant inhabits saturated soil near or in perennial seeps, streams and springs form 2,500 to 6,000 feet in elevation (Arizona Rare Plant Committee 2002). Populations are generally found on southeast-facing shaded slopes (AGFD 2000). No suitable habitat for this plant is present within the project area. It is possible that this species may inhabit springs or drainages that surround the selected lands, however, the nearest known locations of this species are within the Chiricahua and Galliuro Mountains, both of which are distant from the project area.

< **Big Free-tailed Bat** (*Nyctinomops macrotis*) is a BLM sensitive species but is not listed by the AGFD. Big free-tailed bats are widely scattered throughout Arizona during the spring and summer (AGFD 1996). They have been found in a wide variety of habitats, including ponderosa pine, pinyon-juniper, Douglas fir, and Sonoran Desertscrub, but they probably prefer to roost in Sonoran Desertscrub (ibid.). This bat apparently roosts in rock crevices and fissures of mountain cliffs. A few individuals may remain in Arizona during the winter while the majority migrate south into Mexico (Hoffmeister 1986). Big free-tailed bats may roost and/or forage occasionally in the project area.

< **California Leaf-nosed Bat** (*Macrotus californicus*) is a BLM sensitive species and is considered a WSCA by AGFD. The species is a year-round resident of desertscrub habitats of southern and western Arizona, California, and Nevada where it roosts colonially in mines and caves. Short-term roosts include tunnels less than 35 feet deep, but more typically roosts are deep within tunnels several hundred feet long. California leaf-nosed bats were observed within the project area at site 3 (at least eight); at site 5 (one); at site 13 (more than twelve); and at site 21 (at least six) (Figure 3-14). Approximately 300 California leaf-nosed bats historically have been observed in the and these bats were found there again in January 2000 by BLM (B. Robles, BLM, pers. comm. 2002). This species also has been recorded near Pima and Glenbar (Hoffmeister 1986), about 10 miles west of the project area.

< **Canyon (Giant) Spotted Whiptail** (*Cnemidophorus burti stictogrammus*) is a BLM sensitive species but is not listed by the AGFD. *C. b. stictogrammus*, the giant spotted whiptail, is one of four subspecies of the canyon spotted whiptail. Its Arizona range extends from the Baboquivari and Pajarito Mountains in the west to Guadalupe Canyon in neighboring extreme southwestern New Mexico. This range includes the Santa Cruz and San Pedro river basins. Giant spotted whiptails are found in lower Sonoran (chiefly riparian areas) and upper Sonoran life zones (Lowe

1964) in mountain canyons, arroyos, and mesas in arid and semi-arid regions, entering lowland desert along stream courses. This species may occur occasionally in the project area.

< **Cave Myotis** (*Myotis velifer*) is a BLM sensitive species but is not listed by the AGFD. This bat generally inhabits mine shafts, tunnels, and caves, but may also roost under bridges. It is usually found in desertscrub habitats. Roosts are occasionally found in pine/oak vegetation. The majority of the Arizona population migrates to Mexico for the winter, with small numbers remaining in extreme southeastern Arizona. In the project area, more than 100 *Myotis velifer* were observed at site 12 (Figure 3-14). The floor of this adit was approximately 80 percent covered with guano, and entry past 200 feet was unsafe because of ammonia fumes from the guano. In addition, more than 200 cave myotis were observed at site 3; at least eight at site 5; five at site 6; and at least four at site 21 (Figure 3-14). A colony of cave myotis has also been reported near Thatcher (Hoffmeister 1986) within about 10 miles of the project area.

< **Chiricahua Water Scavenger Beetle** (*Cymbiodyta arizonica*) is a BLM sensitive species. Very little information is available regarding the natural history, habitat requirements or range of this species. As a member of the family Hydrophidae (Arnett, cited in Biotic Information System of New Mexico 2002) the species is likely aquatic throughout all or most of its life cycle. Assuming that the species is aquatic, no suitable habitat for this plant is present within the project area. It is possible, however, that this species may inhabit portions of the Gila River or springs or drainages that surround the selected lands and are included in the larger study area.

< **Common Black-hawk** (*Buteogallus anthracinus)* is a BLM sensitive species but is not listed by the AGFD. This hawk nests only along perennial streams with patches of well-developed riparian woodland. No suitable habitat is present within the project area. Black-hawks occur regularly along Bonita Creek and Eagle Creek. Though they are present farther upstream on the Gila River and its tributaries, lack of perennial water limits habitat suitability along the Gila River south of the project area. Black-hawks may occur on rare occasions in the project area during migration.

< **Desert Sucker** *(Catostomus* [= *Pantosteus*] *clarki*) is a BLM sensitive species but is not listed by the AGFD. No suitable habitat for desert sucker or any other fish occurs in the project area. The nearest locations where this species is known to occur are Bonita and Eagle creeks, 10-15 miles east/northeast of the project area.

< **Ferruginous Hawk** (*Buteo regalis*) is designated BLM sensitive and is listed as a WSCA by the AGFD. In Arizona, the species is considered an uncommon to rare and widely distributed summer resident of grasslands in the northern part of the State. It formerly occurred near Prescott and in the southeastern part of the State. Nest sites include trees and bushes, ledges, large rocks, riverbanks, and hillsides. In winter, this species is considered fairly common in open country, mainly irrigated and grassy areas, throughout southern Arizona.

Grassland habitats within the northernmost project area are patchily distributed and small in size, and do not appear typical of habitats used by ferruginous hawks. There are no irrigated agricultural lands within the project area, although irrigated farmlands are common just south of the project area near Safford. It is virtually certain that ferruginous hawk does not occur within the project area during the breeding season, but birds may occasionally visit the larger study area in winter or during migration.

< **Fringed Myotis** (*Myotis thysanodes*) is a BLM sensitive species but is not listed by the AGFD. In Arizona, this species is widespread during summer, except in the southwestern part of the State. Within its range, the species seems to prefer oak woodland, from which it forages into nearby habitats such as low desert, chaparral, and ponderosa pine. In winter, the fringed myotis is found in the mountains of the northwest and southeast corners of the State. This species roosts in caves, mines, and buildings during the day and at night. It has been recorded in the vicinity of the Pinaleño Mountains (Hoffmeister 1986), more than 15 miles southwest of the project area.

Oak woodland habitats are not present within the project area, but the project area is within the summer range of this species in Arizona as shown by Hoffmeister (1986) and habitats appear suitable for foraging. Although not expected to utilize habitats for roosting or breeding, it is possible that the fringed myotis may occasionally visit the project area.

< **Loggerhead Shrike** (*Lanius ludovicianus*) is a BLM sensitive species but is not listed by the AGFD. The loggerhead shrike is an uncommon summer resident in a variety of open habitats, except brushless grassland, throughout the state (Tucson Audubon Society 1999, Monson and Philips 1981). It is a common transient and winter resident in open habitats, especially at lower elevations (Tucson Audubon Society 1999). This species has been observed in the project area, but nesting has not been confirmed.

< **Longfin Dace** (*Agosia chrysogaster*) is a BLM sensitive species but is not listed by the AGFD. No suitable habitat for longfin dace or any other fish occurs in the project area. The nearest locations where this species is known to occur are Bonita and Eagle creeks, 10-15 miles east/northeast of the project area and the Gila River.

< **Long-legged Myotis** (*Myotis volans*) is a BLM sensitive species but is not listed by the AGFD. In Arizona, this species is found in pinyon-juniper, oak, and coniferous forests throughout the northern, central, and southeastern portions of the State. The species has been observed at elevations ranging from 4,000 to over 9,000 feet. Long-legged myotis form summer maternity colonies in buildings, rock crevices, cliffs, and trees. This species does not use caves for roosting during the day, but has been observed using caves as roosts during the night. It has been recorded in the Pinaleño Mountains (Hoffmeister 1986), more than 15 miles southwest of the project area.

Oak woodland habitats and large stands of pinyon-juniper are not present within the project area, but the project area is within the summer range of this species in Arizona as shown by Hoffmeister (1986) and large areas of pinyon-juniper woodland are present north of the project area in the Gila Mountains. Although not expected to utilize habitats in the project area for roosting or breeding, it is possible that the long-legged myotis may occasionally visit the project area or the larger study area.

< **Lowland Leopard Frog** (*Rana yavapaiensis*) is designated BLM sensitive and is listed as a WSCA by the AGFD. This leopard frog occurs in south-central, central, west-central, and extreme northwestern Arizona, primarily below 3,000 feet elevation. Bonita Creek and the Gila River are the nearest locations to the project area where this species is known to occur. Leopard frogs in Eagle Creek were considered to be this species by Platz and Frost (1984), but a single leopard frog collected at 3,300 feet in Eagle Creek and present in the collections at Arizona State University (ASU # 16110), is labeled as Chiricahua leopard frog (see discussion above for Chiricahua leopard frog). No leopard frogs or tadpoles were observed at any of the springs in the study area. The few stock tanks in the study area are ephemeral and it appears highly unlikely that leopard frogs would be present in any of them.

< **Maricopa Tiger Beetle** (*Cicindela oregona maricopa*) is a BLM sensitive species. In Arizona, this beetle occurs along the banks of permanent streams throughout the Central Highlands below the Mogollon Rim. The species has been documented most often on sandy stream banks, but has also been found on gravelly and clay streambanks, and near seeps and reservoirs (AGFD 2001a). The distribution and abundance of the species is likely determined by substrate that is suitable for larval development; ideally the substrate would consist of sand or silt that is soft enough to allow larvae to burrow within and is also capable of holding together and retaining moisture levels that allow larval sustenance (McKown, cited in AGFD 2001a). No suitable habitat for this subspecies is present within the project area, however, it is possible that this species may inhabit portions of the Gila River or springs or drainages that surround the selected lands.

< **Mexican Garter Snake** (*Thamnophis eques*) is designated BLM sensitive and listed as WSCA by

the AGFD. This snake occurs primarily in permanent marshes and streams at middle elevations in central, south-central, and southeastern Arizona. No suitable habitat is present in the project area, but Mexican garter snake may be present along Bonita Creek, Eagle Creek, or portions of the Gila River.

< **Mexican Long-tongued Bat** (*Choeronycteris mexicana*) is a BLM sensitive species and is listed by the AGFD. The Mexican long-tongued bat is a migratory species that occurs in Arizona primarily from the Chiricahuas to the Santa Catalinas and Baboquivaris (AGFD 1996). It roosts in mine tunnels, caves, rock fissures, and rarely buildings, usually singly or in small groups, at elevations of 4,000 to 6,000 feet from the lower oak zone through the mixed pine-oak woodland to the pine-fir belt (Hoffmeister 1986, AGFD 1996). Most known roosts are in areas near water and riparian vegetation. This bat feeds on nectar, pollen, and probably some insects found in flowers. Paniculate agaves are a major food source. The Mexican long-tongued bat may forage in the project area, but roosting is considered unlikely.

< **Northern Goshawk** (*Accipiter gentilis*) is designated BLM sensitive and listed as WSCA by the AGFD. This hawk nests in coniferous woodlands at higher elevations in northeastern Arizona and in mountains of southeastern Arizona. It occurs at lower elevations in some winters. No suitable habitat for nesting is present in the project area. The nearest suitable nesting habitat for this species is in the Pinaleño Mountains more than 15 miles southwest of the project area. Goshawk may occur on rare occasions in the area during winter.

< **Northern Gray Hawk** (*Asturina nitida maxima*) is a BLM sensitive species and is listed by the AGFD. Gray hawk is an uncommon local summer resident along streams with tall cottonwood riparian woodland vegetation in southern Arizona (Tucson Audubon Society 1999). It is seen casually away from breeding areas during migration, and is considered accidental in winter (ibid.). Gray hawks feed primarily on reptiles (lizards and snakes), birds, and small mammals (Johnsgard 1990). This species may occur in the project area during migration.

< **Pima Indian Mallow** (*Abutilon parishii*) is a species listed as Salvage Restricted under the Arizona Native Plant Law. This plant occurs in canyons among rocks, on rocky hillsides, and in canyon bottoms at elevations ranging from 3,000 to 4,700 feet (USFWS 1992). Known locations in Arizona include the Santa Catalina Mountains, Tucson Mountains, and Ragged Top in Pima County, and near Bagdad in Yavapai County (USFWS 1992). A population of about 10 plants was located on BLM lands in the project area on November 17, 1994 (Figure 3-14) (SWCA 1997a). It is possible that this species may occur elsewhere within the project area. However, habitats suitable in the vicinity for this species are probably limited to the foothills of the Gila Mountains.

< **Pocketed Free-tailed Bat** (*Nyctinomops femorosacus*) is a BLM sensitive species but is not listed by the AGFD. The pocketed free-tailed bat reaches the northern limits of its range in central Arizona (AGFD 1996), from the Bill Williams River and Roosevelt Lake southward (Hoffmeister 1986). It appears to prefer caves and crevices along rocky cliffs in semi-arid deserts; however, it will also use buildings and other human-made shelters (ibid.). This bat may roost and/or forage in the project area.

< **Small-footed Myotis** (*Myotis ciliolabrum*) is a BLM sensitive species but is not listed by the AGFD. This species is distributed throughout most of Arizona (with the exception of the southwestern corner) where it is found in oak, juniper, chaparral, and riparian vegetation types. Habitat requirements for roost selection are poorly known, but in summer the small-footed myotis has been found in rock crevices, buildings, caves, mine tunnels, and even in loose tree bark. Maternity colonies appear to be small, containing up to 20 females with young, and have been found in buildings and tree cavities. This species has been found wintering in Arizona south of the Gila River. It has been recorded in the Pinaleño Mountains (ibid.), more than 15 miles southwest of the project area.

Though most of the project area does not support vegetation typical of areas where this species has been found regularly, the project area is within the summer range of this species in Arizona as shown by Hoffmeister (1986). It is therefore possible that this species may utilize mine shafts, mine adits, and natural roost sites for roosting or breeding. None were observed during investigations of 22 mine features on the project area (Figure 3-14).

< **Sonora Sucker** (*Catastomus insignis*) inhabits a variety of habitats from warm water rivers to trout streams from 369 to 2,663 feet. The species has an affinity for gravelly to rocky pools, or at least for relatively deep, quiet waters (Minckley 1973). In Arizona, it is widespread in the Gila and Bill Williams river basins and is known from Bonita Creek, but is rare to absent in the Salt River Canyon due to predation by exotic fish. (AGFD 2001b).

< **Speckled Dace** (*Rhinicthys osculus*) is a BLM sensitive species but is not listed by the AGFD. No suitable habitat for speckled dace or any other fish occurs in the project area. The nearest locations where this species is known to occur are Bonita and Eagle creeks, 10-15 miles east/northeast of the project area.

< **Three-nerved Scurfpea** (*Pediomelum trinervatum*) is a BLM sensitive species. In Arizona, the range for this species includes Cochise County west of the Chiricahua Mountains, and possibly portions of Graham County (AGFD 2001c). This plant inhabits sandy or gravelly loam soils in desert grasslands and creosote scrublands. The plant is generally found from 1,350 to 2,000 feet in elevation, but there is one Graham County collection from the San Simon area that was collected at 3,600 feet (Spellenberg 1999). Three-nerved scurfpea is not known to occur within the project area or surrounding lands, however, no intensive surveys for this plant have been conducted. It is possible this species occurs within the subject lands.

< **Western Burrowing Owl** (*Athene cunicularia hypugea*) is a BLM sensitive species but is not listed by the AGFD. The western burrowing owl is an uncommon and rather local resident in Sonoran grasslands and fallow or abandoned farmlands, except in farm areas around Phoenix and Yuma where it is considered common. It apparently also breeds in desert, sagebrush, and pinyon-juniper habitats, and in disturbed areas such as road cuts and airport landing strips. It depends on rodent burrows for nesting sites. There is an old summer record (date unknown) of this species from Safford, about 10 miles south of the project area (Phillips et al. 1964) and the species nested approximately 0.75 mile north of the Safford airport in 1994 (B. Robles, BLM, pers. comm. 1997). Though grassland habitat within the northernmost project area is similar to habitats known to be used by this species, soils in this area are relatively shallow and rocky and may be unsuitable for nesting sites due to a scarcity of burrowing rodents. Considering that burrowing owls have in the past been observed in the vicinity of Safford, it is possible that they occasionally may visit the project area, although they are not expected to occur regularly.

3.2.3.4 Biodiversity

Biodiversity is variously defined as the total number of kinds of organisms (usually species) in an area or some measure combining the number of kinds of organisms with some measure of their relative abundances. Measurements of biodiversity are typically based on only a partial list of organisms present in an area, generally the larger, more conspicuous organisms such as vertebrates. In many cases, biodiversity is inferred from the numbers and kinds of plant communities in an area, with the assumption that a greater number of plant communities supports a greater biodiversity. This simple index of biodiversity is practical because the cost of inventorying all species that occur in an area is usually prohibitive. More complete measures of biodiversity require a large team of specialists working over many seasons over many years. Though useful, the number of plant communities provides only a rough index to biodiversity since plant community classifications are subjective and can be made at many different scales. Furthermore, not all units of classification support the same numbers of species. Thus, any two scientists delineating plant communities in a given area can arrive at two very different, but equally valid, classifications.

Measurements of biodiversity are extremely scale-dependent. A well-known biological relationship is the species-area curve, which typically shows that the number of species increases with the size of the area surveyed. Most often, the number of species does not increase in direct proportion to area. The rate of additional species usually increases sharply with a small area and gradually tapers off with larger areas.

For conservation purposes, biodiversity is usually measured over relatively large areas. Federal and state lists of "endangered species" or "species of management concern" are typically developed from a global, national, or state perspective. The goals of such lists are typically to prevent the extinction of the listed taxa, not to maintain existing population levels of all species.

No total measure of biodiversity in the project area was made. Instead, two standard approaches were taken to evaluate potential impacts to biological resources: 1) a general plant community classification and 2) a thorough evaluation of special interest species. Because the project area consists primarily of creosotebush-dominated Sonoran Desertscrub and Semidesert Grassland habitat, and because most riparian habitats on the project area are poorly developed, overall biodiversity is expected to be low based on comparisons with other habitats in southeastern Arizona. Measurements of perennial plants confirmed that relatively few species are present in the project area (SWCA 1997g). Evaluations and surveys indicate that few special-interest species are expected to occur regularly in the project area. As with virtually any area, the geographic limits of some species are likely to occur within or near the boundary of the project area. Such limits are not typically considered in evaluations of the biology of an area precisely because they are typical of most areas.

3.2.4 Cultural Resources

3.2.4.1 Historic and Prehistoric Archaeological Resources

On the BLM-managed federal lands in the project area, historic and prehistoric archaeological resources are subject to provisions of the National Historic Preservation Act, as amended (NHPA) and other pertinent federal statutes. Indian burials on these lands are subject to provisions of the Native American Graves Protection and Repatriation Act (NAGPRA). On PD-owned and state lands in the project area, however, archaeological resources are not protected by federal law unless an action on these lands requires federal authorization of some kind (e.g., issuance of a permit under the Clean Water Act by the COE). Indian burials on non-federal lands are not protected by NAGPRA under any circumstances. Arizona state law does provide a measure of protection—not to archaeological resources *per se* on private land—but to all human remains and burial goods that might incidentally be associated with archaeological sites. Arizona Revised Statute 41-865 requires (with certain exemptions) private landowners to follow specific notification and treatment procedures when human remains have been encountered on their property.

Between 1992 and 1996, a 26,527-acre study area that includes federal, PD-owned, and state lands in the project area was surveyed for historic and prehistoric archaeological resources (SWCA 2003a). Surveys were conducted according to protocols specified by the BLM and Arizona State Museum (ASM). Total coverage was achieved by walking in parallel transects no more than 20 m (about 60 feet) apart. Terrain that was not traversable, such as vertical-sided ridgetops, was covered by irregularly spaced transects or by visual inspection with binoculars from a distance (SWCA 2003a).

Within the study area, 119 sites were recorded, including 59 prehistoric sites, 39 historic sites, 10 multicomponent sites, and 11 sites of unknown temporal association (SWCA 2003a). Four sites are now excluded from all proposed alternatives because they are located on land whose surface is controlled by the BLM, but whose mineral rights belong to the Melody Claim. Thus, there are a total of 115 archaeological sites in the project area. Of these 115 sites, 111 are recommended eligible for nomination to the National Register of Historic Places (National Register) for their scientific values. The remaining four sites are thought to be ineligible either because they are not archaeologically significant (three sites) or because they have already been subjected to archaeological data recovery (one site). Sites officially determined by the BLM and the Arizona State Historic Preservation Office to be eligible for the National

Register will be subject to mitigation requirements under NHPA prior to any federal action. Of the 111 sites, 57 are located partly or solely on federal property (the selected lands) and 54 are located partly or solely on PD property.[19] A list of the 119 sites, divided by land ownership and including a brief description, temporal affiliation, land management status, and potential National Register eligibility, is provided in three tables in Appendix D of this document.
The prehistoric sites and site components found in the project area[20] include rock features (41 sites), lithic scatters (20 sites), mixed artifact scatters (14 sites), petroglyphs (13 sites), lithic procurement localities (6 sites), rock shelters (2 sites), ceramic scatters (2 sites) and a water control feature (1 site). Each site or site component could be composed of just one of these elements or two or more of these elements. The historic sites and site components include evidence of mining activity (21 sites), water control features (13 sites), artifact scatters (11 sites), camps (11 sites), rock features (17 sites), corrals (2 sites), a water tank (1 site), habitations (2 site), and a road segment (1 site) (SWCA 2003a). The sites of indeterminate temporal classification ("unknown") all contain rock features (11 sites), but one is also a rock shelter.

For the most part, surveyors found sites to be in good to excellent condition, with their archaeological integrity apparently intact. Observed disturbances were generally minor and limited to only a few sites. Impacts resulting from human activity included disturbance by bull dozers or other earth moving equipment (sites AZ CC:2:153, 158, 166, 213, 251, and Field Site 999); construction and maintenance of a radio tower (AZ CC:2:214); and surface clearing and possible looter pits (AZ CC:2:154). Observed deterioration resulting from natural processes included minor and moderate surface erosion (AZ CC:2:186, 259); erosion of historic water control features (AZ CC:2:263, 275, 277); disturbance by plant growth (AZ CC:2:259); rock fracturing from freezing and thawing (AZ CC:2:152); and general weathering of surface artifacts, including, but not limited to, rusted and corroded metal objects, decomposing wooden and leather objects, and worn sherds (SWCA 2003a).

Most sites within the project area have the potential to contribute knowledge about both prehistoric and historic human activities in the Safford Valley. The most interesting and suggestive prehistoric site characteristics identified during the surveys include:

< a low occurrence of ceramic artifacts, which were found in limited numbers and at only ten sites;

< a relatively low occurrence of formal tools, including projectile points (only eight confirmed points and two possible point fragments);

< several lithic procurement sites (AZ CC:2:194, 199, 205, 210, 212, 213, 214); and

< the presence of artifacts identified as possibly dating from the Archaic period (7500 B.C.-A.D. 300) (AZ CC:2:155, 188, 203).

Potential exists for increasing our understanding of the chronology of prehistoric occupation in the region; patterns of settlement and movement; resource exploitation, including plant and lithic procurement and hunting; subsistence and diet; and lithic technology. Of particular interest is the possibility that one or more sites in the project area could shed light on occupation and activities during the Archaic period in the Safford Valley, of which little is known. Most of the previously studied sites in the region have been ascribed to the Formative period (A.D. 200-1450) of the Mogollon and/or Hohokam culture groups (SWCA 2003a). This pattern likely holds true for sites in the project area as well, although little diagnostic material was found during the surveys (SWCA 2003a).

Apachean people are known to have used the general area as winter camps since early historic times, and four sites in the project area (AZ CC:2:154, 159, 169, and 170) were identified as including features that may be Apachean. If so, these sites, and possibly others, offer the opportunity to examine a culture and time period rarely encountered in the archaeological record. Apache sites certainly exist, but they are

[19] The land on which AZ CC:2:176 [ASM] is located was purchased by PDSI from the Arizona State Lands Department.

[20] Excluding sites in the Melody Claim area.

difficult to find and identify. Traditional Apache lifeways left behind few material remains, and very little of that is diagnostically Apachean.

Later historic sites in the project area have potential for increasing our understanding of the mining technology used in the area; the relationships of local mining activity and regional socioeconomic and transportation systems; and the lifeways of early miners, including their living arrangements, material culture, and diet. Historic water control sites may contribute information about Civilian Conservation Corps (CCC) activities in the area during the Depression era, including construction methods used, the geographical extent and nature of CCC projects, and how those projects related to livestock grazing at the time of construction. Some water-control sites may also pre- or post-date the depression era and may inform on water resource management of other eras.

3.2.4.2 Traditional Cultural Properties Identified by Indian Tribes

For this Project, 11 Indian tribes were consulted regarding the presence or absence of known traditional cultural properties[21] in the project area per the requirements of NHPA (Table 3-19). The 11 tribes were also asked about places sacred to them that might warrant consideration under the American Indian Religious Freedom Act (AIRFA) and Executive Order 13007. Most of the tribes consulted consider the lands in the project area to be part of their historic aboriginal territory, or they claim ancestry to the prehistoric peoples who occupied these lands (SWCA 2000). Properties identified during consultation that are officially determined by the BLM and the Arizona State Historic Preservation Office to be eligible for inclusion in the National Register of Historic Places as Traditional Cultural Properties will be subject to mitigation requirements under the NHPA prior to any federal action. Sites identified during consultation as being sacred sites may warrant consideration by the BLM under AIRFA and Executive Order 13007.

The consultation process has included a review of published literature regarding Native American use of the Safford vicinity; correspondence and telecommunications with each of the 11 tribes requesting their concerns regarding places of traditional importance in the project area; and meetings with tribal personnel and visits to the project area as reported in Table 3-19. Each tribe was sent a copy of the archaeological inventory report [SWCA 1997b, revised to 2002a] and a videotape showing the project area and some of the identified archaeological sites. In June 1999, all tribes were also sent the preliminary Treatment Plan for review (SWCA 2003b). Copies of other archaeological reports related to the Project were made available to the tribes as well (SWCA 1998, 2003b).

Early in the consultation process, representatives of the Navajo Nation indicated that the Navajo had no knowledge of traditional cultural places in the project area; therefore, consultation with that tribe was considered complete at that point (SWCA 1998, 2000). Eight other tribes reported the presence of traditional cultural properties in the project area.[22] These 76 sites, which are all recorded prehistoric archaeological sites, are listed in Table 3-20. The Four Southern Tribes (the Tohono O'odham Nation, Ak-chin Indian Community, Gila River Indian Community, and Salt River Pima-Maricopa Indian Community) identified 14 archaeological sites as being traditional cultural properties, and would likely include the recently discovered field sites 998 and 999, bringing their TCPs to 16. The White Mountain Apache Tribe identified 3 sites as traditional cultural properties. The San Carlos Apache Tribe, the Hopi Tribe, and the Pueblo of Zuni each consider all prehistoric sites within the project area as traditional cultural properties, so they each have thus identified 76 sites as TCPs. Of the 76 sites, 43 are located on BLM-administered federal land and 33 are located on PD land.

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[21] National Register Bulletin 38 defines a traditional cultural property as a property that may be "eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1989).

[22] As reported by SWCA (1998), some groups have reported that "all prehistoric sites" are to be considered TCPs. Because some additional sites have been located since that report was finalized, and because some of the eligibility recommendations have also been altered, there are now 76 TCP sites within the study area (excluding Melody Claims) whereas only 74 sites were reported in tribal correspondence prior to 1998.

Indian tribes have identified prehistoric archaeological sites in the project area as being places of traditional importance for three reasons: the site is considered ancestral, the site is considered sacred, and/or the site is thought to include a Native American grave. All tribes consulted indicated concern about the treatment of human remains and associated funerary objects that may be located within the project area. One possible Native American grave site has been identified in the project area and may warrant protection under the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, as amended.

Three of the sites listed in Table 3-20 (AZ CC:2:200, 211, and 234) were identified by tribes as sacred sites and warrant consideration under Executive Order 13007, Indian Sacred Sites. These sites have been determined to be eligible for the National Register by the BLM. All three sites are considered sacred by the White Mountain Apache Tribe; AZ CC:2:200 and 211 are sacred to the Tohono O'odham Nation, Hopi Tribe, and the Ak-chin, Gila River, and Salt River Pima-Maricopa Indian Communities.

Table 3-19. Indian Tribes Consulted for the Proposed Dos Pobres/San Juan Project, Dates of Meetings, and Field Visits

Tribes	**Meeting Dates**	**Field Visit Dates**
Fort Sill Apache Tribe	**-**	**-**
Four Southern Tribes*	December 14, 1995 December 20, 1996**	September 20, 1995 March 16, 1996 May 19, 1997 December 16, 1999
Hopi Tribe	August 17, 1995	February 21, 1996
Mescalero Apache Tribe	-	-
Navajo Nation	-	-
Pueblo of Zuni	-	-
San Carlos Apache Tribe	September 20, 1994 December 7, 1994	June 9, 1997
White Mountain Apache Tribe	July 19, 1995 May 21, 1997	June 23, 1997

* The Four Southern Tribes are the Ak-chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation.

** Meetings were also held individually with the Gila River Indian Community on September 2, 1994; October 19, 1994; December 13, 1994, and November 16, 1999.

Source: SWCA 1998, 2000

Table 3-20. Places of Traditional Importance Identified by Tribes in the Project Area

ASM Site No. Prefix = AZ CC:2:	Site Type	Tribe				
		Ak-chin Indian Community Gila River Indian Community Salt River Pima-Maricopa Indian Community Tohono O'odham Nation	White Mountain Apache Tribe	San Carlos Apache Tribe	Hopi Tribe	Pueblo of Zuni
132	rock features	-	-	X	X	X
146	petroglyph	X	-	X	X	X
147	petroglyph, rock shelter, lithic scatter	X	-	X	X	X
148	rock feature	-	-	X	X	X
149	petroglyph	X	-	X	X	X
150	petroglyph	X	-	X	X	X
151	lithic scatter	-	-	X	X	X
152	petroglyph	X	-	X	X	X
153	sherd and lithic scatter	-	-	X	X	X
154	rock features	-	-	X	X	X
155	lithic scatter	-	-	X	X	X
156	petroglyph	X	-	X	X	X
157	petroglyph	X	-	X	X	X
159	rock features	-	-	X	X	X
158	petroglyph	X	-	X	X	X
160	rock features, lithic and groundstone scatter	-	-	X	X	X
164	rock feature, lithic and groundstone scatter	-	-	X	X	X
166	petroglyph, rock feature	X	-	X	X	X
168	lithic and groundstone scatter	-	-	X	X	X
169	rock features, sherd and lithic scatter	-	-	X	X	X
170	lithic and groundstone scatter	-	-	X	X	X
171	lithic scatter, quarry	-	-	X	X	X
186	sherd and lithic scatter	-	-	X	X	X
188	sherd and lithic scatter	-	-	X	X	X
191	lithic and groundstone scatter	-	-	X	X	X
192	lithic scatter	-	-	X	X	X
193	rock alignments, terraces	-	-	X	X	X
194	lithic procurement	-	-	X	X	X
195	lithic and groundstone scatter	-	-	X	X	X

Table 3-20, continued. Places of Traditional Importance Identified by Tribes in the Project Area

ASM Site No. Prefix = AZ CC:2:	Site Type	Tribe				
		Ak-chin Indian Community Gila River Indian Community Salt River Pima-Maricopa Indian Community Tohono O'odham Nation	White Mountain Apache Tribe	San Carlos Apache Tribe	Hopi Tribe	Pueblo of Zuni
196	sherd and lithic scatter	-	-	X	X	X
200	hill, rock rings	X	X	X	X	X
207	rock feature	-	-	X	X	X
208	rock feature	-	-	X	X	X
210	lithic procurement	-	-	X	X	X
211	rock ring	X	X	X	X	X
212	lithic procurement	-	-	X	X	X
213	lithic procurement	-	-	X	X	X
214	lithic procurement	-	-	X	X	X
215	lithic scatter, rock piles	-	-	X	X	X
217	lithic scatter	-	-	X	X	X
218	rock pile	-	-	X	X	X
219	lithic scatter	-	-	X	X	X
220	rock piles	-	-	X	X	X
221	lithic scatter	-	-	X	X	X
222	rock piles	-	-	X	X	X
223	rock features	-	-	X	X	X
225	rock piles	-	-	X	X	X
226	rock ring	X	-	X	X	X
227	rock pile	-	-	X	X	X
228	sherd and lithic scatter, habitation?	-	-	X	X	X
229	rock piles	-	-	X	X	X
231	rock piles, petroglyphs	X	-	X	X	X
233	rock piles	-	-	X	X	X
234	rock shelter, rock pile	-	X	X	X	X
241	petroglyph	X	-	X	X	X
245	rock feature	-	-	X	X	X
246	lithic scatter	-	-	X	X	X
249	rock features, lithic scatter	-	-	X	X	X
253	rock features, lithic scatter	-	-	X	X	X
254	rock features, lithic scatter	-	-	X	X	X
255	rock feature	-	-	X	X	X
257	rock features, sherd and lithic scatter	-	-	X	X	X
259	sherd scatter	-	-	X	X	X

Table 3-20, continued. Places of Traditional Importance Identified by Tribes in the Project Area

		Tribe				
ASM Site No. Prefix = AZ CC:2:	**Site Type**	**Ak-chin Indian Community Gila River Indian Community Salt River Pima-Maricopa Indian Community Tohono O'odham Nation**	**White Mountain Apache Tribe**	**San Carlos Apache Tribe**	**Hopi Tribe**	**Pueblo of Zuni**
261	rock feature	-	-	X	X	X
264	lithic scatter	-	-	X	X	X
266	rock features	-	-	X	X	X
267	rock features, lithic scatter	-	-	X	X	X
268	sherd scatter	-	-	X	X	X
269	rock features, lithic scatter	-	-	X	X	X
270	lithic scatter, rock ring	-	-	X	X	X
271	rock features, lithic scatter	-	-	X	X	X
272	rock features, lithic scatter	-	-	X	X	X
273	rock features, lithic scatter	-	-	X	X	X
274	rock feature, lithic scatter	-	-	X	X	X
FS 998	petroglyph	X	-	X	X	X
FS 999	petroglyph	X	-	X	X	X

3.2.5 Socioeconomic Resources

The information reported in this section was taken for the most part from a socioeconomic analysis prepared by ESI Corporation for the BLM (ESI 1997). Census data for 2000 were taken from the U.S. Census Bureau State and County Quickfacts Website (http://quickfacts.census.gov/qfd/). The source for Graham County employment data for 2000 was the Arizona Department of Economic Security (DES) website (http://www.de.state.az.us/links/economic/webpage/).

3.2.5.1 Population and Demographics

During the 2000 Census, 33,489 persons were counted in Graham County. With 7.2 persons per square mile, the county ranks 11th out of 15 counties in the State of Arizona for population density. About half of the residents live in the communities of Safford, Thatcher, and Pima in the Safford Valley. Neighboring Greenlee County, where PD's Morenci Mine is the principal employer and many residents of Graham County work, is also sparsely inhabited (14th out of 15 counties in the State) with a population of 8,547 in the year 2000.

The population of Graham County has grown by 138 percent over the last 40 years (Table 3-21). Growth has been continuous but at varying rates. Population increased by 18 percent between 1960 and 1970, by 37.9 percent between 1970 and 1980, by 16.1 percent between 1980 and 1990, and by 26.1 percent between 1990 and 2000.

By comparison, from 1960 to the present, the population of Greenlee County has decreased by 25.7 percent (Table 3-21). Between 1960 and 1970, the population dropped from 11,509 to 10,330, a decrease of 10.2 percent. In the following decade, the population rebounded to 11, 406, only to drop again between 1980 and 1990 to 8,008. Between 1990 and 2000, the population increased slightly to 8,547.

Table 3-21. Population Change in Graham County and Greenlee County, 1960-2000

Year	Population in Graham County	Population in Greenlee County
1960	14,045	11,509
1970	16,578	10,330
1980	22,862	11,406
1990	26,554	8,008
2000	33,489	8,547

Source: U.S. Census Bureau Website http://www.census.gov/population/cencounts/az190090.txt

3.2.5.1.1 Minority Groups and Low-Income Populations. Minority groups and low-income populations are specifically considered in this document as part of compliance with Executive Order 12898 regarding Environmental Justice.

According to the 2000 Census, approximately 67.1 percent of the population in Graham County identified themselves as White, 14.9 percent as Native American, 13.3 percent as Other, 1.9 percent as Black, and 0.6 percent as Asian. In answer to a separate question, 27 percent of individuals who had already identified themselves as belonging to one of the aforementioned groups further identified themselves as being of Hispanic origin. Between 1990 and 2000, while the overall population in the County increased by 26.1 percent, the Native American population increased by 26.3 percent, the Black population by 26.7 percent, and the Hispanic population by 35.3 percent.

Based on census data, the three Graham County census block groups[23] in which more than 100 Native American persons live coincide with the San Carlos Apache Reservation, with concentrations of Native Americans centered in the towns of Bylas and Peridot. Census block groups that include portions of Thatcher; portions of Safford; and the towns of Solomon, San Jose, and Sanchez contain the greatest concentrations (more than 300 persons) of persons identifying themselves as of Hispanic origin. The locations of these communities relative to the project area are depicted in Figure 3-15.

Low-income populations are defined for this analysis as census block groups in which the percentage of households with an annual income of less than $15,000 is equal to or greater than 40 percent. About half (17) of the 33 census block groups in Graham County fall into this category. They encompass most of the northern half and the southwestern quarter of the County, as well as about a third of the City of Safford and most of the Town of Pima. Census block groups with the highest proportion of low-income households are located within the San Carlos Apache Reservation (49, 59, and 82 percent); just outside the boundary of the Reservation (56 percent); and within pockets in the communities of Safford (52 and 55 percent), Thatcher (47 and 50 percent), and Pima (49 percent). The distribution of low-income populations relative to the project area is depicted in Figure 3-15. No developed residential areas are located within five miles of the proposed pits, leach pad, and development rock stockpiles.

3.2.5.2 Local and Regional Economy

The local economy in the Safford area, which includes the communities of Safford, Thatcher, and Pima (all within six miles of each other), is driven by agriculture, government employment, wholesale and retail trade, and tourism. Farming and ranching have been important in the area since the Upper Gila River Valley was first settled by Anglo Americans in the early 1870s. Some 40,000 irrigated acres are under cultivation, primarily with cotton. Safford has also long been the chief market for a widespread region that includes all of Graham and Greenlee Counties, part of northern Cochise County, and rural areas across the state border in western New Mexico. The copper-mining communities of Clifton and Morenci in Greenlee County are particularly important as a source of out-of-county consumers for Safford retail

[23] Census block groups by definition contain roughly 1,000 persons, although the 33 block groups in Graham County that were censussed in 1990 contained from 29 to 2,261 persons.

businesses. In turn, the Morenci Mine provides employment for many residents in the Safford area.

In recent decades, government employment has become increasingly important locally. This is principally attributable to two Arizona state prisons and one federal prison located near Safford. Safford is also the county seat of Graham County and the site of several federal offices serving the region. The newest industry to affect the area in a significant way is tourism, as increasing numbers of visitors discover the scenic beauty and recreational opportunities offered by the region's mountains and forests, the Gila River, and the upland desert terrain. This growing economic component fuels retail trade and lodging, restaurant, and other service sectors of the local economy. Commercial infrastructure for tourism (i.e., lodging, restaurants) is highly concentrated in Safford. Important tourist attractions within Graham County include but are not limited to:

< Mt. Graham and Riggs Lake in the Coronado National Forest Pinaleño Mountains
< San Carlos Lake
< Roper Lake State Park
< Hot Well Dunes Recreation Area
< Black Hills Rockhound Area
< Black Hills Back County Byway
< Discovery Park
< Gila Box RNCA, including Bonita Creek and its tributaries
< Aravaipa Canyon Wilderness
< hot springs

While none of these attractions by itself is important as either a generator of tourist traffic or as a source of regional income, together they provide a diversity of recreational opportunities that support potential future increases in the regional tourism industry.

3.2.5.2.1 Employment. According to the Arizona Department of Economic Security, the total civilian labor force in Graham County in 2000 averaged 10,300 individuals. Of these, 9,625 were employed and 675 were unemployed, for an unemployment rate of 6.5 percent. In the same year, neighboring Greenlee County had a civilian labor force of 4,075 and an unemployment rate of 5.6 percent. The highest unemployment rates in Graham County occurred on the San Carlos Apache Reservation. In 2000, Bylas, Arizona, the Reservation community closest to the project area, had an unemployment rate of 12.2 percent, while the Reservation as a whole had an unemployment rate closer to 20 percent.

In Graham County, at least half of employment is in two areas: agriculture and government. Trade and services account for another third. Of the 9,625 employed persons in Graham County in 2000, 73 percent were non-agricultural wage and salary employees, and a total of 27 percent either worked for wages in agriculture, were self-employed (often in agriculture), or worked outside the county (Table 3-22). Government jobs accounted for 27.2 percent of employed persons, reflecting the importance of the prisons as an industry in the area. Wholesale and retail trade accounted for 20.8 percent of jobs, and services accounted for another 15.8 percent. Graham County has a diversified economy when compared to Greenlee County, which has about 60 percent of its total labor force employment in the mining sector.

3.2.5.2.2 Income. Median household income is low in Graham County. In 1997, the county ranked 10th out of the 15 counties in Arizona, with a median household income of $27,564. This compares to the state median household income of $34,751. Also in 1997, Graham County had the sixth highest rate of persons in poverty (22.8 percent) of all counties in the State. An estimated 26.4 percent of children in Graham County were below the poverty line, compared to 23.2 percent for the state as a whole. The low-income figures, in part, reflect the influence of low-paying agricultural jobs, and contrast sharply with income figures for Greenlee County. In 1997, Greenlee County ranked first among the state's counties in median

household income ($43,696) and had the lowest rate of persons in poverty (10.3 percent). Greenlee County also had the lowest rate of children below the poverty line (12.6 percent). The high income figures can be attributed to relatively high-paying mining jobs.

Table 3-22. Employment Structure in Graham County, 2000

Employment Sector	No. of Persons	% of Total
Non-Agricultural Employment		
Government	2,625	27.2%
Trade	2,000	20.8%
Services & Misc.	1,525	15.8%
Construction	275	2.9%
Manufacturing	275	2.9%
Transportation, Communications, and Public Utilities	150	1.6%
Finance, Insurance, and Real Estate	175	1.8%
Subtotal of Non-Agricultural Employment	**7,025**	**73.0%**
Agriculture, Self-employment, Out-of-county Employment	**2,600**	**27.0%**
TOTAL	**9,625**	**100.0%**

Source: Arizona Department of Economic Security Website at http://www.de.state.az.us/links/economic/webpage/.

3.2.5.2.3 Taxes. Several sources of revenue for the county and municipal governments in Graham County would be affected by the alternative actions analyzed in this EIS. These sources include locally collected property and sales taxes; distributions from the State of Arizona to local governments of revenue produced by the Transaction Privilege, Use and Severance Tax and by state income taxes; and payments in lieu of taxes (PILT) paid by the federal government to local governments for federal lands which generate no county property taxes.

Private property taxes collected directly by county and by municipal governments are an important source of locally based revenues. These taxes are collected on assessed property values. The percent of total net assessed value by property class in Graham and Greenlee Counties is compared in Table 3-23. In Graham County, total net assessed value ($68,846,902) is only one-third that of Greenlee County ($228,467,780), even though Graham County is larger in area and population than Greenlee County. The difference is the relatively higher assessed value on patented mining property, which accounts for almost 87 percent ($198,579,797) of the property tax base in Greenlee County. In Graham County, the property tax base—principally residential, commercial, and agricultural property—is more diversified and of lower cash and assessed value.

Table 3-23. Percent of Net Assessed Property Values by Class in Graham and Greenlee Counties

Property Class Description*	GRAHAM COUNTY % of Total Net Assessed Value ($68,846,902)	GREENLEE COUNTY % of Total Net Assessed Value ($228,467,780)
Mines	0.2%	86.92%
Commercial	25.7%	1.6%
Agricultural	20.8%	0.85%
Residential	41.56%	3.32%
Other	11.67%	7.3%

*The property classes actually used for valuation have been grouped for purposes of this table.

The State of Arizona collects revenue from businesses in the State via a Transaction Privilege, Use and Severance Tax. Portions of this revenue are returned to each county by a formula based on both the total amount of collections in that county and the proportion of the state population represented by that county. Disbursements are also made to municipalities, but these payments are based solely on population. Table 3-24 lists the taxable activities and businesses, taxable income, and tax collections for Graham and Greenlee counties for fiscal year July 1, 1994 to June 30, 1995. The State also collects income taxes and distributes portions of this revenue to incorporated cities and towns as "revenue sharing."

The numbers presented in Table 3-24 illustrate some of the fundamental differences between the economies of Graham and Greenlee counties. In Graham County, retail services dominated tax collections with 59.3 percent. This reflects Safford's role as the retail shopping center for the region. In Greenlee County, the category "Other Taxable Activities," which includes mining, dominated with 79.8 percent. This percentage reflects the preeminent position of the Morenci Mine in the economic structure of the county, while the dollar amount ($14,442,571) demonstrates the mine's capacity to generate public revenue. In Greenlee County, this category alone produced almost 60 percent more Transaction Privilege, Use and Severance Tax revenue than all the categories combined in Graham County. The figures presented in Table 3-24 also illustrate the greater diversity in Graham County's economic base compared to that of Greenlee County.

Table 3-25 shows the distribution of Transaction Privilege, Use and Severance Tax revenue by the State to county governments in 1994-1995. Once again the figures illustrate economic differences between Graham and Greenlee counties, particularly the economic impact of taxes paid by PD's Morenci Mine on county revenues. Compared to Graham County, Greenlee County's disbursement is twice as high, even though Graham County's population is three and one-half times larger. This disparity means that the benefit from this tax source to each resident of Greenlee County is seven times greater than that to each resident of Graham County.

Another source of revenue for county governments that would potentially be affected by the Project is "payments in lieu of taxes" (PILT) made by the federal government to offset the limited property tax base that results from federal land ownership. These payments are established, and limited in the total amount payable to any one county, by a complex set of formulas involving the county's population, acreage of certain classes of federal lands, amounts of other federal payments to the county, and other variables. Population is a determining factor in setting limits (ceilings) for payments made to local governments. Currently, the BLM makes payments in lieu of taxes in the amount of approximately $11,365 to Graham County for the land surrounding the proposed Dos Pobres/San Juan Project on the basis of $0.69 per acre (J. Malys, BLM, pers. comm., 2000); the rate may change from year to year. In 1999, Graham County received $749,771 in total PILT (from BLM and Forest Service).

Table 3-24. Tax Collections from Taxable Activities by Business Classifications for Graham and Greenlee Counties, July 1, 1994-June 30, 1995

GRAHAM COUNTY	Net Taxable Income ($)	Collections ($)	% of Collections from County	% of Total Collections, Statewide

Communications	4,570,420	228,521	2.5%	
Restaurants/Bars	13,755,771	687,789	7.5%	
Commercial Leases	3,781,983	117,102	1.3%	
Rentals of Personal Property	5,168,130	258,407	2.8%	
Contracting (All)	22,882,300	1,144,115	12.4%	
Retail	109,138,042	5,456,902	59.3%	
Other Taxable Activities	26,102,843	1,315,075	14.3%	
TOTAL	**185,399,489**	**9,207,911**		**0.36%**
GREENLEE COUNTY				
Communications	$1,398,317	$69,916	0.4%	
Restaurants/Bars	3,742,304	187,115	1.0%	
Commercial Leases	408,357	12,673	0.1%	
Rentals of Personal Property	693,048	34,652	0.2%	
Contracting (All)	19,886,371	994,319	5.5%	
Retail	47,101,798	2,355,090	13.0%	
Other Taxable Activities	516,534,389	14,442,571	79.8%	
TOTAL	**589,764,584**	**18,096,336**		**0.71%**

3.2.5.3 Infrastructure

The rapid population growth (33 percent) in the Safford area over the past decade has put pressure on the existing infrastructure and those who staff it (ESI 1997). This growth has created a need for mid-priced housing; expanded and improved sewer facilities; a new source of electric power; new school facilities; and additional city, county, and school system staff. Additional health care professionals are needed as well.

3.2.5.3.1 Housing. The housing conditions in Graham County are somewhat atypical, compared to the rest of Arizona. Graham County ranks second in the percentage of owned and rented units built prior to 1980, indicating that the housing stock is fairly dated when compared to the rest of Arizona. According to the 1990
Census, Graham County had 5,976 (56 percent) individuals owning or renting housing units built prior to 1980 (ESI 1997, Appendix A-13). Median values for owner-occupied homes ($51,300) and rents paid ($221/month) in Graham County are among the state's lowest.

In the second half of 1996, 121 homes were sold on the new and resale markets in the Safford area. In January 1997, approximately 75 houses were on the resale market; about 45 percent of these were listed for less than $80,000. The supply of older, pre-owned, less expensive houses appears to meet the demand at the lower price range of the market. No new low-income housing or high-density housing is being planned. Few rental opportunities are available.

Four developers are currently building housing projects to meet a shortfall in the mid to upper ranges of the market. Approximately 263 new homes are planned in the $85,000 and above range; the average new home price is $102,000. The City of Safford's "tentative plan" for future new water hook-ups includes 350 housing units at one project, 400 at another, and several hundred more at other locations (ESI 1997).

3.2.5.3.2 Utilities. The City of Safford recruited a director for the city's utilities operation. Officials are now gathering data on staffing needs in that department to take care of deferred maintenance.

Table 3-25. Distribution of Transaction Privilege, Use and Severance Tax Revenue by the State of Arizona to Graham and Greenlee Counties in 1994-1995

Counties	Distribution Amounts	Per-capita, 1995	Population, 1995	% of All Distributions	% of Population
Graham	$1,868,969	$62	30,025	0.52%	0.71%
Greenlee	$3,756,460	$442	8,500	1.05%	0.20%
All Counties	$356,339,290	$84	4,228,900	100%	100%

< **Water.** The City of Safford provides domestic water for its own residents, for the nearby Town of Thatcher, and for smaller, unincorporated areas in the immediate vicinity. This water is drawn from Bonita Creek. Currently serving a peak demand of 4,000 gpm (ESI 1997), city officials are seeking to obtain new water supplies to augment their existing water right for 3,240,000 gallons per day (gpd) (3,584.5 ac-ft/yr) (H. West, Hydrologist, BLM, pers. comm.). In order to address water issues, particularly the ongoing adjudication of Gila River water rights, the city has retained a hydrogeologist. Determining Gila River water rights is a long-term undertaking affecting many central Arizona communities and Indian tribes. Domestic water for the Town of Pima and adjacent unincorporated areas is provided by Graham County Utilities, Inc. Domestic water for all other unincorporated areas in the county is provided by small, private water systems. Water for irrigation is supplied by the Gila Valley Irrigation District. The city is committed to providing water service to 425 new residential, commercial, and other sites by Fiscal Year 1997-1998.

< **Electric/Gas**. Currently, electrical power in Safford is provided by the city. All other areas of the eastern Gila Valley are serviced by one of two utility companies: Graham County Utilities, Inc. or Graham County Electric Cooperative, Inc. This electricity is generated at a coal-fired power plant near Willcox, Arizona. Natural gas service for the entire area is provided by Graham County Utilities, Inc. or Graham County Electric Cooperative, Inc. They distribute gas supplied by the El Paso Natural Gas Company.

< **Sewer.** City voters approved in May 1997 a bond sale to fund construction of a new wastewater treatment plant with a maximum capacity of 5 million gpd (3,472 gpm). The new facility is currently operational. The Town of Thatcher is presently upgrading its sewer system and expanding the system's capacity from 350,000 gpd to 1 million gpd.

< **Telephone.** Telephone service in the Safford Valley is provided by Qwest Communications.

< **Garbage.** Currently, the City of Safford owns three sideload trucks, two rearload trucks, and one open-bed truck. There are seven full-time employees in the sanitation department, and the city plans to hire one additional driver plus one truck within the next five years. The city uses the county landfill and pays a share of its maintenance cost (L. Lopez, Safford City Planner, pers. comm.). At this time, the landfill has capacity for about 20 to 25 more years of use at the current rate of use, but the county would like to purchase an additional 240 acres of adjacent BLM lands to provide another 60 to 80 years of use for future (J. Ward, Graham County Engineer, pers. comm.).

3.2.5.3.3 Schools. There are four school districts in the larger Safford area: Safford Unified School District Thatcher Unified School District, Pima Unified School District, and Solomon Unified School District, with the Safford and Thatcher districts having the largest numbers of students. The selected lands lie in the Safford and Solomon school districts. The Safford schools are near capacity, and either a new building or an addition on an existing building will be needed. As of October 1, 1996, the Safford Unified School District had five schools and a total enrollment of 3,043 students:

< 1 primary (pre-school through 2nd grade): 706 students
< 1 intermediate (grades 2-5): 661 students
< 1 middle school (grades 6-8): 685 students
< 2 high schools (grades 9-12): 918 students and 73 students

Thatcher area schools are also at capacity or in need of improvement. The District is building a new high school as of this writing in anticipation of a predicted increase in enrollment by one-third by the year 2000 (ESI 1997).

3.2.5.3.4 Emergency Response. The Safford Police Department employs twelve officers, and has been steadily increasing staff over the past few years to keep pace with the growth of the city. The city's fire department is staffed on a volunteer basis. This service is currently satisfying the needs of the city; expansion of this service is not seen as an immediate issue.

Safford serves as the primary medical hub for Graham and Greenlee counties. The area is currently suffering from a shortage of physicians and nurses. The Mt. Graham Community Hospital in Safford is expanding capacity in a number of areas, including construction of an intensive care unit. The hospital has built a new medical office building, a new intensive care unit, and additional operating rooms. The recent expansion should attract high-quality doctors to the area (ESI 1997).

3.2.5.4 Transportation

This section describes the current conditions of roads, intersections, bridges, and air traffic corridors in and near the project area.

3.2.5.4.1 Roads. The unpaved, ranch roads that provide access to the project area are described in Section 3.2.1.2. (see Figure 1-1). The roadways described here are paved segments that are most likely to be affected by the proposed mining activities being analyzed in this EIS. They include the roads and highways listed below; a few key intersections on those roads; and five bridges crossing the Gila River (Figure 3-16). The following roadway segments were studied by Curtis Lueck & Associates (1997) to determine current conditions and anticipated project impacts:

< US Highway 70 (US 70) from the town of Pima east to Sanchez Road
< US Highway 191 (US 191) from US 70 south to Interstate 10
< Safford-Bryce Road
< Airport Road - Eighth Avenue to Sanchez
< Reay Lane - US 70 to Safford Bryce Road
< Sanchez Road from Airport Road to US 70

US 70 is the main highway through the Safford area, paralleling the Gila River on the south side. It connects the communities of Safford, Thatcher, and Pima to each other; to Globe, Arizona, 73 miles west; and eventually to the metropolitan Phoenix area.

US 191, a state-designated scenic route, runs south from US 70 to Interstate 10, providing access to Mount Graham and Roper Lake State Park, both popular recreational areas. It also runs northeast, connecting US 70 to the communities of Clifton and Morenci and to the scenic White Mountains.

Safford-Bryce Road is a rural road that parallels the Gila River on the north side. It runs from Eighth Avenue (City of Safford) northwest to Eden Road (beyond Pima) and is connected to US 70 via Eighth Avenue over the Safford Bridge, Reay Lane over the Thatcher Bridge, Bryce-Eden Road over the Pima Bridge, and Eden Road over the Eden Bridge. The Phelps Dodge Mine Road from the Dos Pobres pit site terminates at Safford-Bryce Road (Figure 3-16). Four at-grade drainage crossings (dip-sections) carry stormwater across Safford-Bryce Road during runoff events. Such crossings can become impassable for short periods.

Airport Road continues the Safford-Bryce Road alignment from Eighth Avenue east to Sanchez Road. It connects to US 70 via Sanchez Road over Solomon Bridge (Figure 3-16). The San Juan Mine, Lone Star Mountain, and Solomon Pass Roads all terminate at Airport Road (see Figure 1-1).

Reay Lane over the Thatcher Bridge and Sanchez Road over Solomon Bridge are the crossings likely to receive the most traffic as a result of proposed mining activities.

Table 3-26 summarizes the condition of these roadway segments, including their operational characteristics, average daily traffic, and level of service (LOS). An LOS rating (LOS A through LOS F) is a qualitative description of how well a roadway operates under prevailing traffic conditions. A rating of LOS A indicates free-flowing traffic, whereas LOS F indicates forced flow and extreme congestion. In communities with a population below 50,000, LOS C is the level used as the planning and design goal. In the Safford transportation area, every roadway segment studied operated acceptably at LOS B or better, with most operating at LOS A (Parsons Brinckerhoff 1992). Most of the major roadways in the Safford area, including all but one of the segments listed above, are considered to be in adequate physical condition for passenger vehicles and commercial shipping (Curtis Lueck & Associates 1997). The exception is the Safford-Bryce Road. Although this road was given a “Fair” rating in a 1992 study (Parsons Brinckerhoff 1992, see Table 3-26), in 1997, portions were described as deteriorating, with pavement failing and edges raveled or poorly defined (Curtis Lueck & Associates 1997).

Table 3-26. Current Road Conditions in the Safford Area

Road Segment	Lanes (CLT = Center Left Turn)	Operational Characteristics*	Average Daily Traffic	Year of Count	Level of Service (LOS)
US 70, Main St. (Pima) - Reay Ln.	4+CLT	-	8,000	1995	-
US 70, Reay Ln. - Montieth Ln.	2	Fair	16,800	1995	B
US 70, Montieth Ln. - Sanchez Rd.	2	Good	5,400	1995	B
US 191, US 70 - Old Country Club	4+CLT	Good	7,000	1995	A
US 191, Old Country Club - I-10	2	Good	4,400	1995	A
Safford - Bryce Rd.	2	Fair	1,051	1996	A
Airport Rd.	2	Good	1,800	1996	A
Reay Ln.	2	Fair	600	1994	A
Sanchez Rd.	2	Fair/Good	372	1996	A

* Fair = sufficient sight distances, well-maintained pavement and striping, adequate shoulder, and the overall conditions give the user a sense of comfort and safety. Good = good operational characteristics overall, better than average pavement and striping.
Source: Curtis Lueck & Associates 1997, reporting operational characteristics and LOS data from Parsons Brinckerhoff (1992).

3.2.5.4.2 Intersections. The following six intersections are those most likely to be affected by proposed mining operations (Curtis Lueck & Associates 1997):

< US 70/Reay Lane (Thatcher): Unsignalized with stop-control on Reay Lane.
< US 70/Eighth Avenue (Safford): Signalized.
< US 70/US 191(Safford): Signalized.
< US 70/Sanchez Road: Unsignalized with stop-control on Sanchez Road.
< Safford-Bryce/Reay Road: Unsignalized “T” configuration with stop-control at Reay Road.
< Safford-Bryce/Eighth Avenue/Airport Road: Unsignalized “T” configuration with stop-control at Safford-Bryce/Eighth Avenue intersection.

The two signalized intersections, US 70/Eighth Avenue and US 70/US 191, were analyzed for level of use in a previous study (Parson Brinckerhoff 1992) and found to be operating well under capacity at that time. None of the unsignalized intersections listed above have been similarly analyzed in that study, but an unsignalized intersection on US 70 just east of Reay Lane (US 70/Stadium Drive) experienced peak-hour congestion in the mornings and afternoons (LOS ratings of E and D, respectively).

3.2.5.4.3 Bridges. Five, two-lane bridges crossing the Gila River provide access to Safford/Bryce and Airport Roads from the south: Eden, Pima, Thatcher, Safford, and Solomon bridges. None of the bridges carry posted weight restrictions. The Eden, Pima, and Thatcher bridges have a single, 12-foot-wide through lane in each direction and concrete “Jersey” barriers, with a two- to four-foot-wide shoulder area and no sidewalks. The Solomon Bridge is a new bridge built by the Arizona Department of Transportation and Graham County in 1996. This 810-foot-long bridge has two lanes, with a 30-foot-wide deck and is designed to convey the 25-year flood flow of about 67,000 cfs and to withstand scour during major floods. The Safford Bridge (Eighth Avenue) is an old bridge built during the 1930s. At only 23 feet wide, it is narrow and in a poor state of repair with apparent spalling of the concrete and exposed rebar.

3.2.5.4.4 Air Traffic Corridors. The Safford Municipal Airport adjoins the southern boundary of the

project area (Figure 1-2). Airspace restrictions associated with the airport require that air traffic not be obstructed by any object located within a three-dimensional space surrounding the airport. Such an object (e.g., a radio antenna or transmission line pole) would obstruct air traffic if its height were greater than the imaginary upper surfaces defining the three-dimensional space. This space is bounded on top by a roughly circular, flat, imaginary Horizontal Surface that acts as a "ceiling" 150 feet above the airport, and an imaginary Conical Surface that flares upward and outward from the circumference of the Horizontal Surface at a slope of 20H:1V (20 horizontal units to 1 vertical unit) in every direction. The circumferences of these two concentric "circles" are shown Figure 3-17, and more detailed definitions are presented in Figure 3-18. According to Federal Aviation Administration regulations, the radius of the flat Horizontal Surface must extend no less then 5,000 ft beyond each end of the airport's primary surface (runway), and the radius of the upward-sloping Conical Surface must extend another 4,000 ft beyond the circumference of the Horizontal Surface. At the Safford Municipal Airport, elevations of the Horizontal Surface range from 3,307 to 3,326 feet, paralleling the gentle slope of the primary runway. The Conical Surface on the north side of the airport, where a proposed power transmission line for the Project would be sited, ranges from 3,307 to 3,326 feet at the edge of the Horizontal Surface to 3,507 feet at the outer edge of the Conical Surface. These heights constrain any development within the outer "circle" shown in Figure 3-17 (SWCA 1997h).

3.2.6 Indian Trust Resources

All Department of the Interior bureaus and offices, including the BLM, have a responsibility to protect and maintain Indian Trust Resources (also known as Indian Trust Assets). Secretarial Order 3175 mandates that agencies, "when engaged in the planning of any proposed project or action, will ensure that any anticipated effects on Indian trust resources are explicitly addressed in the planning, decision, and operational documents...that are prepared for that project" (USDI 1993). As part of this responsibility, agencies are required to consult with the recognized tribal government with jurisdiction over the trust property that the proposal may affect, the appropriate office of the Bureau of Indian Affairs, and the Office of American Indian Trust if their evaluation reveals impacts to Indian Trust Resources.

Indian trust assets are "legal interests in property held in trust by the United States for Indian tribes or individuals" (BLM 1995b). Assets are further defined as "anything owned that has monetary value...[such as] real property, physical assets or intangible property rights" (ibid.). Examples of things which could be trust assets are lands, minerals, and water rights. Trust assets cannot be sold, leased, or otherwise alienated without the approval of the United States.

Indian trust assets in the general vicinity of the Project include water rights to the Gila River held by the San Carlos Apache Tribe and by the Gila River Indian Community. These tribes own 6,000 af/yr and 303,288 af/yr (L. Sibala, Hydrologist, BIA, telefax 1998) of water rights to the Gila River, respectively. In addition to these rights to surface flows in the Gila River, the San Carlos Apache Tribe holds another Indian Trust Asset in groundwater under the Reservation based upon Sections 4.0 and 4.3 of the San Carlos Apache Tribe Water Rights Settlement Agreement of March 30, 1999 (Settlement Agreement), to which the United States was a signatory. The Settlement Agreement states that such rights "are held by the United States in trust for the Tribe," and that the scope thereof is "...a permanent right to the on-Reservation diversion, use, and storage of all Groundwater beneath the Reservation, subject to a Groundwater management Plan to be developed by the Secretary." There are no Indian trust lands, minerals, or other Indian trust assets in or in the general vicinity of the project area, as identified in Figure 1-2.

3.3 OFFERED LANDS

This section provides descriptions of the offered lands proposed for exchange. The 11 properties are grouped as either base or optional properties. Organization follows the major resource categories for the selected lands except for Indian Trust Resources, as none of the 11 properties is Indian trust land, represents a legal interest held in trust by

the U.S. for an Indian tribe or individual, or is derived from rights reserved by or granted to an Indian tribe or individual by treaty, statute, or executive order.

3.3.1 Base Package

The base package of offered lands consists of five PD-owned properties: Amado, Curtis, Musnicki, Schock, and Feulner. The Amado and Curtis properties are located within and adjacent to the boundary of the BLM-administered Gila Box Riparian National Conservation Area (RNCA); the Musnicki property borders the BLM-administered Dos Cabezas Mountains Wilderness; and the Schock and Feulner properties lie within the boundary of the Sonoita Valley Acquisition District (District). The Schock property also borders the BLM-administered Las Cienegas National Conservation Area (NCA). The existing natural and human environment of these properties is described below.

3.3.1.1 Amado and Curtis Properties

The Amado and Curtis are separate properties, but because both are located in the Gila Box RNCA, Graham County, Arizona; both straddle Bonita Creek; and portions of the properties adjoin each other; they are described together. Both properties are characterized by undeveloped mountainous terrain paralleling segments of Bonita Creek. This perennial creek flows through a canyon, with small tributary canyons leading down to the heavily vegetated creek floodplain. Elevations range from a low of about 3,800 feet on both properties to about 4,300 feet on the Amado property and about 4,700 feet on the Curtis property (Zenitech 1998b).

3.3.1.1.1 Land Use. Owned by PD, the 180-acre Amado property and 675 acres of the 755-acre Curtis property (with a five-acre exclusion) are inholdings physically encompassed by, but not included in, the 21,767-acre, BLM-administered RNCA (SWCA 1996c), which is a Long-Term Management Area (LTMA) identified in the Safford District RMP.

Figure 2-27 shows the Amado and Curtis properties and surrounding land ownership. An approximately 80-acre portion of the Curtis property lies outside of the approved Gila Box RNCA boundary. The 855 acres of both properties within the Gila Box represent about 50 percent of existing private land in-holdings (1,720 acres) and about four percent of the total land (23,487 acres) within the RNCA perimeter. Other private in-holdings within the perimeter account for an additional three percent of the total, while BLM lands account for 93 percent. The outside boundary of the adjoined Amado and Curtis properties totals about 10.9 miles, of which 8.75 miles (or approximately 80 percent) abut BLM lands (ibid.).

These properties are physically accessible via four-wheel-drive roads and trails periodically maintained by the BLM. Four-wheel-drive legal access is possible from the west via Red Knolls Canyon Road (off Solomon Pass Road). Four-wheel-drive access is also available from the east via Hackberry Spring Road. Non-vehicular access is available from the west via Bushy Canyon Road, or visitors may take Solomon Pass Road to Lee Trail and walk approximately three river-miles up Bonita Creek to the Curtis property and another mile upstream to the Amado property. From the east, nonvehicular access is available via the Safford-Morenci Trail off East Bonita Rim Road, which is a four-wheel-drive road (SWCA 1996c).

Because the properties are private, no public access or public recreation is currently authorized, but PD has not prevented physical access to or public recreation on the properties. Recreational activities on adjacent Gila Box RNCA land, which has similar natural resource values, include, but are not limited to, camping, hiking, bird and wildlife watching, water play, photography, and archaeological site study (BLM 1991, 1994b). The Gila Box RNCA is a popular recreational spot for both local residents and visitors, drawing an estimated 25,000 people per year (S. Knox, BLM, pers. comm.). The reaches of Bonita Creek that cross the Amado and Curtis properties are included in an 8.1-mi-long segment that has been recommended by the BLM and the Department of the Interior for Wild and Scenic River designation (BLM 1994a). Resources determined to be "outstandingly remarkable" in this segment include fish and wildlife habitat, riparian, water quality, recreational, and cultural resource values.

PD has let grazing leases for both Amado and Curtis properties, which are located within the BLM's Bonita Creek and Johnny Creek Allotments, respectively (Phelps Dodge Corporation 1996). The properties are not encumbered by utilities easements, rights-of-way, or residential leases. Phelps Dodge owns the mineral estate on 220 acres, with the remaining acres under federal reserve minerals status (ibid.). Phelps Dodge also owns one surface water right of approximately 1.0 acre-foot per year (af/yr) from Bonita Creek for stock watering on the Amado property (SWCA 1996c).

The overall visual quality of the Amado and Curtis properties reflects the rugged terrain and the relative lack of human-caused disturbance in upper Bonita Creek. Landscape elements include flowing water, steep canyon walls, and diverse vegetative communities. An aerial inspection conducted in 1995 found that the dirt roads passing through the properties were overgrown with vegetation and appeared to be untraveled (Zenitech 1998b). Other evidence of human activity was limited to a corral on the Amado property that appeared to be in a state of disuse and an empty stocktank near the northern end of the Curtis property. No buildings, waste containers, illegal dumping, mining, or other indications of development were visible from the air (ibid.). The adjacent public lands in the RNCA are classified as VRM Class II (BLM 1991), a classification that would also apply to the Amado and Curtis properties if they were acquired. The management objective of Class II is to retain the existing character of the landscape. Management activities may be seen but they should not attract the attention of the casual observer. The level of change to the characteristic landscape should be low. Any changes must repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape (BLM 1991, 1994b).

The Amado and Curtis properties are not located within one mile of a federal hazardous materials National Priority List site or an Arizona Water Quality Assurance Revolving Fund (WQARF) site; a zipACIDS site; or a Resource Conservation and Recovery Act (RCRA) transport, storage, or disposal facility. No Emergency Response Notification System (ERNS) sites are located on the property or in the vicinity. No registered Underground Storage Tanks (UST) sites are located on the property or on adjacent properties. No Leaking Underground Storage Tanks (LUST) sites, or open or closed landfills, are located on or within 0.5 mile of the property (Zenitech 1998b).

3.3.1.1.2 Physical Resources. Review of physical resources on the offered lands for this document was limited to geology/mineral potential. No other physical resources, such as air quality or soils, were investigated. The discussion of the water resources of the offered lands is limited to water rights (see Land Use section of each property), and riparian and other biological resources related to water resources (see Biological Resources section of each property).

Erosion-resistant volcanic rocks make up the bluffs and cliffs along Bonita Creek. These rocks, Miocene to Oligocene in age, include silicic (rich in silica) to mafic (rich in iron and magnesium) flows and pyroclastic rocks, as well as some subvolcanic intrusions (Zenitech 1998b). The potential for the occurrence of six kinds of mineral resources on the Amado and Curtis properties was evaluated and is summarized below in Table 3-27.

3.3.1.1.3 Biological Resources. A well-developed riparian community exists along the segments of

Bonita Creek that flow through the two properties (SWCA 1996c). This community is characterized by an overstory of mature Fremont cottonwood, Goodding willow, sycamore, mesquite, and netleaf hackberry, with an understory of desert broom, seep-willow, coyote willow, burro brush, and an occasional tamarisk or tree tobacco. Wildrye and bermuda grass are present, along with native grasses such as threeawn and side-oats grama (C. Templin, BLM, pers. comm.). Continuous recruitment of trees is occurring, as indicated by stands and individuals of various ages throughout the canyon. Vegetation within the creek includes watercress and unidentified annual emergent vegetation, but because of frequent scouring, no well-developed community of emergent or aquatic vegetation grows along the stream. In the upstream portions of the properties where the canyon floor broadens, mesquite trees form bosques of several acres in extent. Most of the trees are young to middle-aged, but a few are large, older specimens. Upland vegetation on the canyon walls and ridges above the creek includes typical Sonoran Desertscrub plants such as prickly pear cactus, ocotillo, and catclaw acacia. Large patches of undisturbed native grasses are also present. Much of this upland is very steep and appears to be inaccessible to grazing cattle (SWCA 1996d).

Because perennial water is available in the canyon and little human activity takes place, wildlife is abundant. A large number of bird species were observed during field surveys in February 1995 (SWCA 1996d). The abundance and mix of species seen at that time suggest that Bonita Creek Canyon is important to wintering and migrating species, as well as to the expected summer resident species. Rocky Mountain bighorn sheep were seen during the surveys, and mammal sign observed included that of mule deer, black bear, raccoon, mountain lion, coyote, collared peccary, beaver, and white-throated woodrat. The canyon cliffs include numerous overhangs, small caves, and crevices that may provide roosts for several species of bats.

The special interest species identified by federal and state agencies that are known to occur, may occur, or are unlikely to occur on the Amado and Curtis properties, or for which the likelihood of occurrence is unknown, are listed in Table 3-28. Bonita Creek and its 100-year floodplain through both properties has been designated critical habitat for the spikedace and loach minnow and has been proposed as critical habitat for the Gila chub.

3.3.1.1.4 Cultural Resources. A review of archaeological site records at the Arizona State Museum and the BLM Safford Field Office indicated that some archaeological survey has been conducted along the reach of Bonita Creek that traverses the Curtis and Amado properties (SWCA 1996a). Sites recorded within the property boundaries include two sites dating from the prehistoric Formative period (A.D. 1250-1450) and a few sites dating from the Late Historical period (A.D. 1890-1930). The prehistoric sites are rock shelters (AZ W:14:1 and AZ W:14:4). The second of these, “Ceremonial Cave,” contained wooden artifacts thought to serve a ritual function. This site also was used during the Late Historical period, apparently as a homesite. Other recorded historical sites include a homesite containing ruins of a stone building (AZ W:19:9) and two sites with irrigation features (AZ W:14:8 and AZ W:14:11). During a recent field visit to the properties by an archaeologist, most of the recorded sites were recommended to be eligible for inclusion in the *National Register of Historic Places*, in part because they are likely to contain information about the settlement-subsistence systems of the canyon's prehistoric and historical inhabitants (SWCA 1996a).

3.3.1.1.5 Socioeconomic Resources. The Amado and Curtis properties, taxed as Vacant Land, generated $1968 and $397, respectively, in private property taxes for Graham County in 1999. Each property generates $105 in annual grazing fees for PD.

Table 3-27. Summary of Mineral Potential of the Amado and Curtis Properties

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C

Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b, 1997c

3.3.1.2 Musnicki Property

The 640-acre Musnicki property is located in Cochise County on the western edge of the San Simon Valley, at the base of the Dos Cabezas Mountains. Most of the property appears relatively flat, but it slopes very gently uphill toward the south and west before rising abruptly into mountainous terrain along the southern and western borders (Zenitech 1998b). Elevation ranges between 4,000 and 4,400 feet. An ephemeral wash, Ninemile Creek, and a few tributary washes drain to the northeast. A small, apparently perennial pool is located amid boulders near the ranch site. Its source may be Ninemile Spring, located about 0.5 mile south of the property boundary (Zenitech 1998b). The property contains an old ranch house, the former headquarters of the Ninemile Ranch.

3.3.1.2.1 Land Use. The Musnicki property boundary totals 4.5 miles, of which 1.75 miles (or 39 percent) adjoin the 11,998-acre Dos Cabezas Mountains Wilderness (SWCA 1996c). The remaining 2.75 miles (or 61 percent) adjoin private lands or BLM-administered land not included in the Wilderness. The Dos Cabezas Mountains Wilderness is managed by the BLM to provide for the long-term protection and preservation of the area's wilderness character. Figure 2-28 shows the property in relation to surrounding land ownership.

The Musnicki property is physically accessible via an unnamed dirt road off Happy Camp Canyon Road. This unimproved road terminates at the Ninemile Ranch near the southern boundary of the property. No public access is currently authorized for this route although it is the only approach to the northeastern corner of the Dos Cabezas Mountains Wilderness from the north (ibid.). A road in Sheep Canyon to the east provides physical but not legal public access to the eastern end of the wilderness.

Table 3-28. Special Interest Species Potentially Occurring on the Amado and Curtis Properties, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species That Are Known to Occur		
Common black-hawk	*Buteogallus anthracinus*	WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Lowland leopard frog	*Rana yavapaiensis*	WSCA
Sonora sucker	*Catastomus insignis*	SS
Speckled dace	*Rhinichthys osculus*	SS
Spotted bat	*Euderma maculata*	SS, WSCA
Species That May Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Mexican garter snake	*Thamnophis eques*	WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Small-footed myotis	*Myotis ciliolabrum*	SS
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Spikedace	*Meda fulgida*	T, WSCA
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Western red bat	*Lasiuris blossevillii*	WSCA
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Apache trout	*Onchorhynchus apache*	T, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA

Table 3-28, continued. Special Interest Species Potentially Occurring on the Amado and Curtis Properties, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species Unlikely to Occur		
Arizona cliffrose	*Purshia subintegra*	E, HS
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Long-legged myotis	*Myotis volans*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mount Graham red squirrel	*Tamiasciurus hudsonicus grahamensis*	E, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Peebles bluestar	*Amsonia peeblesii*	SS
Rosy boa	*Lichanura trivirgata*	SS
Sonoran desert tortoise	*Gopherus agassizii*	SS, WSCA
Western yellow bat	*Lasiuris xanthinus*	WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Wet canyon talussnail	*Sonorella macrophallus*	CA
Big free-tailed bat	*Nyctinomops macrotis*	SS
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law.

Because this property is privately owned, no recreational uses by the public are authorized. However, potential recreational uses include, but are not limited to, hunting, hiking, camping, picnicking, photography, and bird and wildlife watching (ibid.).

This property is adjacent to the BLM's Ninemile grazing allotment, and PD has let a grazing lease for the property to the holder of the BLM allotment. In addition to the grazing lease, Valley Telephone Cooperative, Inc. has a buried telephone line on the property that provides service to the residential structure at Ninemile Ranch (S. George, scoping respondent, 1994). Phelps Dodge has let a month-to-month residential lease for the property. No other easements, rights-of-way, or other encumbrances are associated with this property. Phelps Dodge owns the mineral estate on 320 acres and the remaining acres are federal reserve minerals (Phelps Dodge Corporation 1996). Phelps Dodge also owns one surface water right of 15.0 af/yr from Ninemile Creek for agricultural, domestic, and stock watering use on this property (SWCA 1996c).

No formal visual quality analysis was completed for the Musnicki property; however, natural resource elements of the property that define its visual quality include moderate to heavy upland and riparian vegetation and gently sloping terrain that provides open vistas of the Dos Cabezas Mountains Wilderness and the San Simon Valley. The land to the extreme south and west is bouldery and rises steeply into the Dos Cabezas Mountains. A small area near the southern boundary of the property includes substantial human alterations to the natural environment, including the old Ninemile Ranch residence, storage sheds, a windmill and water tower, a corral, and various ranch and farming equipment (Zenitech 1998b). If acquired, the Musnicki property would be managed by BLM as VRM Class IV, for which the management objective is to provide for management activities that require major modification of the existing character of the landscape. The level of change can be high, but the visual impact of alterations should be minimized through careful location and minimal disturbance and by repeating the basic elements. The adjoining Dos Cabezas Mountains Wilderness is categorized as VRM Class I, for which the objective is to preserve the existing character of the landscape by allowing only very limited management activity. The level of change should be very low and must not attract attention (Safford District RMP; BLM 1991).

Aerial and ground inspection of the Musnicki property revealed no illegal dumping or evidence of underground storage tanks. Some surface staining, apparently from oil, was observed on the ranch road. Lead-acid batteries and containers of automotive cleaning agents and a cattle feed supplement were observed near the ranchhouse, but they were subsequently removed by the owner. The property is not located within one mile of a federal hazardous materials National Priority List site or an Arizona WQARF site; a zipACIDS site; or an RCRA transport, storage, or disposal facility. No ERNS sites are located on the property or in the vicinity. No registered UST sites are located on the property or on adjacent properties. No LUST sites, or open or closed landfills, are located on or within 0.5 mile of the property (Zenitech 1998b).

3.3.1.2.2 Physical Resources. The geology of the Musnicki property consists of early Miocene-to-Oligocene granitoid rocks, overlying much older Precambrian granitoid and metamorphic rocks. Surface geology includes fine-grained alluvial material derived from these parent rocks, with outcroppings of bedrock forming the transition from the San Simon Valley to the Dos Cabezas Mountains (Zenitech 1998b). The potential for occurrence of mineral resources on this property is summarized in Table 3-29.

3.3.1.2.3 Biological Resources. Upland slope vegetation includes mesquite, Palmer agave, wolfberry, desert hackberry, catclaw acacia, white-thorn acacia, prickly pear, turpentine bush, squawbush, ocotillo, beargrass, Coahuila juniper, Emory oak, and scrub oak. The majority of the property is vegetated by small mesquites, which increase in size along the dry washes, and other xeroriparian vegetation consisting of desert broom and desert willow (SWCA 1996d).

Wildlife species or sign observed during a site visit included black bear, gray fox, mule deer, coati, coyote, Harris' antelope squirrel, black-tailed jackrabbit, white-throated woodrat, common raven, cactus wren,

canyon wren, rock wren, canyon towhee, northern mockingbird, house finch, verdin, black-throated sparrow, Gambel's quail, phainopepla, greater roadrunner, red-tailed hawk, scrub jay, rattlesnake, and various lizards (SWCA 1996d). The AGFD classified this property as Resource Category IV habitat for wildlife.

Table 3-29. Summary of Mineral Potential of the Musnicki Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	C
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b, 1997c

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Musnicki property, or for which the likelihood of occurrence is unknown, are listed in Table 3-30.

Table 3-30. Special Interest Species Potentially Occurring on the Musnicki Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Big free-tailed bat	*Nyctinompos macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Fringed myotis	*Myotis thysanodes*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Longfin dace	*Agosia chrysogaster*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pinaleño hedgehog cactus	*Echinocereus ledingii*	SR
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS

Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Species Unlikely to Occur		
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Beautiful shiner	*Cyprinella formosa*	T, WSCA

Table 3-30, continued. Special Interest Species Potentially Occurring on the Musnicki Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Canelo Hills ladies' tresses	*Spiranthes delitescens*	E, HS
Chuckwalla	*Sauromalus obesus*	SS
Cochise pincushion cactus	*Coryphantha robbinsorum*	T, HS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Ferruginous hawk	*Buteo regalis*	WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Lemmon fleabane	*Erigeron lemmonii*	C
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mountain plover	*Charadrius montanus*	PT
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	T, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Peebles bluestar	*Amsonia peeblesii*	SS
Ramsey Canyon leopard frog	*Rana subaquavocalis*	CA, WSCA
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS
Sonoran desert tortoise	*Gopherus agassizii*	SS, WSCA
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
White-faced ibis	*Plegadis chihi*	SS

Table 3-30, continued. Special Interest Species Potentially Occurring on the Musnicki Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Whooping crane	*Grus americana*	E
Yaqui chub	*Gila purpurea*	E, WSCA
Yaqui catfish	*Ictalurus pricei*	T, WSCA
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	E, WSCA
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.1.2.4 Cultural Resources. The property has not been systematically surveyed for cultural resources, although several sites have been recorded within a mile of it, and one site may have been recorded within it (SWCA 1996a). Recorded sites to the west and northwest of the property include five rock-shelter sites that, as a group, contain petroglyphs, bedrock mortars, roasting pits, potsherds, flaked-lithic artifacts, and pieces of shell. These sites are located at or near the base of the Dos Cabezas Mountains. Also present are one or two historic-to-recent trash scatters. Immediately northeast of the property is a probable habitation site with
surface structures, possible pit houses, and a variety of decorated pottery types that suggest an occupation date between A.D. 650 and 1150. A site recorded by Gila Pueblo as Ninemile Ruin may be located within the property. In addition, several unrecorded sites were observed during a visit to the property (SWCA 1996a). There may be additional sites yet unrecorded on the property.

3.3.1.2.5 Socioeconomic Resources. The Musnicki property is taxed as Agriculture/Ranch land, and PD paid Cochise County $1371 in private property taxes for this property in 1999. The grazing lease for this property generates approximately $100/lease-year to PD; a residential lease generates $240/year.

3.3.1.3 Schock Property

The 240-acre Schock property is located at the base of the Mustang Mountains, in the northeastern corner of Santa Cruz County, Arizona. Gently rolling hills rising to mountainous terrain along the eastern border dominate the topography. Elevation ranges from 5,000 to 5,600 feet. Two minor ephemeral washes drain the property (Zenitech 1998b).

3.3.1.3.1 Land Use. This property is a privately owned inholding within the Sonoita Valley Acquisition Planning District. Comprising about 100,800 acres of state, private, and BLM land, the Sonoita Valley Acquisition Planning District surrounds the 42,000-acre Las Cienegas NCA. Private and state land within the District has been identified as desirable for acquisition and addition to the Las Cienegas NCA per stipulations of the Las Cienegas National Conservation Area Establishment Act (HR 2941).

The Schock property has a total boundary of 3.0 miles, of which 0.5 abuts the Las Cienegas NCA and 0.5 abuts state lands. The remaining 2.0 miles border other private lands and BLM lands in the Sonoita Valley Acquisition Planning District (SWCA 1996c). Figure 2-29 shows the location of the Schock property in relation to surrounding land ownership.

This property, which is gated and fenced, is legally accessible to the public via a county-maintained paved road to Elgin, Arizona, off of State Highway 82. Because the property is privately owned, no public recreational uses are authorized. However, potential dispersed recreational uses of the property may include, but are not limited to, hiking and bird and wildlife watching (SWCA 1996c).

Other than a grazing lease, no other easements, rights-of-way, or residential leases are attached to the Schock property. Phelps Dodge owns the mineral estate on 160 acres, and the remaining 80 acres are federal reserve minerals (ibid.). No surface water rights have been filed for this property.

Some natural resource elements which define the property's visual resources include the rolling hills and open grasslands of the surrounding areas and a view of the monument-like volcanic core of Mount Bruce in the nearby Mustang Mountains. No buildings, mines, or other evidence of human development is visible on the property (ibid.). Visual resource management objectives for the neighboring Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most land in the planning area will be managed for the objectives of VRM Class II.

Aerial and ground inspection of the Schock property revealed no illegal dumping, surface staining, unusual odors, discarded waste containers, or indications of underground storage tanks or aboveground storage tanks. No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Schock property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.1.3.2 Physical Resources. The underlying geology of the Schock property consists of surficial deposits of Holocene to middle Pleistocene alluvium. Adjacent mountainous terrain is composed primarily of sedimentary rocks of Permian and Pennsylvanian age (Zenitech 1998b). The potential for occurrence of mineral resources on the Schock property was evaluated and is summarized below in Table 3-31.

Table 3-31. Summary of Mineral Potential of the Schock Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b

3.3.1.3.3 Biological Resources. Vegetation on the property is characteristic of the Semidesert Grassland community. The property appears to have been burned in the recent past, as evidenced by charred stumps of beargrass and has been heavily grazed by cattle and horses. Vegetative cover is dominated by both native and introduced grasses, including blue grama, black grama, side-oats grama, three awn, and lovegrass, interspersed with narrow-leafed yuccas, agaves, and beargrass. Shrubs occur in clumps or are widely spaced on the lower portions of the property, and increase in density uphill. Shrub and tree species observed include catclaw acacia, desert broom, sumac, ocotillo, mortonia, threadleaf groundsel, and fairy duster. Cactus and succulent species present include banana yucca, desert spoon, narrow-laved yucca, shindagger, prickly pear cactus, cane cholla, Arizona rainbow cactus, beargrass, Palmer agave, and Bisbee beehive cactus. A few mesquite trees are present in the lower portions of the property, and junipers are present at the higher elevations. Limestone outcrops upslope often had several species of ferns growing on them, as well as dense patches of shindaggers and some brilliantly colored patches of lichens (SWCA 1996d).

Wildlife observed during site visits included Gambel's quail, rock wren, chipping sparrow, rufous-winged sparrow, common raven, cactus wren, dark-eyed junco, rufous-sided towhee, canyon towhee, American pipit, horned lark, and mule deer. Although no pronghorn were observed, the AGFD documented them on the property during a 1992-1993 aerial survey (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Schock property, or for which the likelihood of occurrence is unknown, are listed in Table 3-32.

3.3.1.3.4 Cultural Resources. The Schock property has not been surveyed for cultural resources, and no sites have been recorded in the vicinity. No cultural materials were observed during field reconnaissance. Archaeological sites—particularly flaked-lithic scatters—may occur on the property. The density of sites of this type, in the kind of setting represented by the Schock property, is anticipated to be relatively low. Nevertheless, the property may contain one or more archaeologically significant sites (SWCA 1996a).

3.3.1.3.5 Socioeconomic Resources. The Schock property, taxed as Agriculture/Ranch land, generated $1187 in property taxes for Santa Cruz County in 1999. Phelps Dodge currently receives $100/lease-year in grazing fees for the Schock property (Phelps Dodge Corporation 1996).

3.3.1.4 Feulner Property

The 320-acre Feulner property is located within Pima County, northwest of the Whetstone Mountains about 1.0 mile east of Cienega Creek. Topography in the area consists of sparsely vegetated hills cut by entrenching arroyos draining west into the creek. The property is bisected from the southeast to the northwest by an ephemeral wash. Elevation on the property ranges from 4,100 to 4,400 feet (Zenitech 1998b).

3.3.1.4.1 Land Use. This privately owned property lies within the perimeter of the Sonoita Valley Acquisition Planning District and 1.0 mile from the Las Cienegas NCA boundary. The property has a total boundary of 3.0 miles, all of which abuts state lands (SWCA 1996c). Figure 2-30 shows the property and surrounding land ownership.

The Feulner property is physically accessible via a maintained, gated but unlocked, gravel road off of Interstate 10 eastbound southeast of Tucson. The route crosses state and possibly private land, providing access for ranchers in the vicinity, and for Sierra Southwest Transco, Tucson Electric Power Company, and Southwest Gas Company to maintain a 115 kV powerline, a 138 kV powerline, and a natural gas

pipeline, respectively (SWCA 1996c). The road does not provide legal public access to the property. Application would have to be made to the Arizona State Land Department to authorize public use of the road, and permission would have to be obtained from any private landowner whose property is crossed.

Table 3-32. Special Interest Species Potentially Occurring on the Schock Property, Santa Cruz County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Baird's sparrow	*Ammodramus bairdii*	WSCA
Bartram stonecrop	*Graptopetalum bartramii*	SS
Big free-tailed bat	*Nyctinomops macrotis*	SS
Button cactus	*Epithelantha micromeris*	SR
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassiz*	SS, WSCA
Sprague's pipit	*Anthus spragueii*	WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Species Unlikely to Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Canelo Hills ladies' tresses	*Spiranthes delitescens*	E, HS
Chiricahua leopard frog	*Rana chiricahuensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Gentry indigobush	*Dalea tentaculoides*	SS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Huachuca milkvetch	*Astragalus hypoxylus*	SS
Huachuca spring snail	*Pyrgulopsis thompsoni*	C

Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS

Table 3-32, continued. Special Interest Species Potentially Occurring on the Schock Property, Santa Cruz County, Arizona

Species' Common Name	Scientific Name	Status*
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Rhinicthys chrysogaster*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
Santa Cruz striped agave	*Agave parviflora ssp. parvilfora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonora chub	*Gila ditaenia*	T, WSCA
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spotted bat	*Euderma maculatum*	SS, WSCA
Stephan's riffle beetle	*Heterelmis stephani*	C
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cocherell's striate disc	*Discus shemeki cockerelli*	SS
Dalhouse spleenwort	*Asplenium (Ceterach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

Because the property is privately held, no public recreational uses are authorized. Potential recreational uses include, but are not limited to, hiking, camping, picnicking, hunting, and bird and wildlife watching. No eligible or recommended river segments occur on the property; however, the property is within the watershed of a portion of Cienega Creek recommended by the BLM and the Department of the Interior for Wild and Scenic River designation (ibid.).

Currently PD has let a grazing lease for the property, but no easements, rights-of-way, residential leases, or other encumbrances have been negotiated for this property. Minerals are reserved by the federal government. One surface water right belonging to Empirita Ranch Corporation for 3.0 af/yr from Upper Coyote Spring has been filed for stock watering use on the property (SWCA 1997i).

No formal visual quality analysis has been completed for the Feulner property; however, some natural resource elements of the area that define its visual quality include native grassland and woodland vegetation, and surrounding rolling hills (SWCA 1996c). No buildings, mines, or other indications of development are visible on the property (Zenitech 1998b). Visual resource management objectives for the nearby Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most land in the planning area will be managed for the objectives of VRM Class II.

An aerial inspection of the Feulner property revealed no buildings, waste containers, illegal dumping, mining, or other indications of development. No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.1.4.2 Physical Resources. The Feulner property consists of older surficial deposits of middle Pleistocene to late Pliocene alluvium. The subsurface geology consists of sedimentary rocks of Permian and Pennsylvanian age that has minimal surface exposure (Zenitech 1998b). The potential for occurrence of mineral resources on the Feulner property was evaluated and is summarized in Table 3-33.

Table 3-33. Summary of Mineral Potential of the Feulner Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b

3.3.1.4.3 Biological Resources. The Feulner property contains elements of both the Semidesert Grassland and the Arizona Upland Subdivision vegetative communities of the Sonoran Desertscrub biome. The wash's riparian vegetation is dominated by white-thorn acacia, mesquite, netleaf hackberry, desert broom, desert sumac, and rubber rabbitbrush. Common shrubs in the uplands include fairy-duster, white-thorn acacia, catclaw acacia, banana yucca, desert spoon, creosote bush, ocotillo, mortonia, Mexican crucillo, shindaggers, and Palmer agave. Cacti observed on the property include prickly pear, Fendler hedgehog cactus, Arizona rainbow cactus, needle-spined pineapple cactus, Bisbee beehive cactus, barrel cactus, cane cholla, and desert Christmas cactus. At least 10 needle-spined pineapple cacti, formerly a federal Category 2 candidate species, were observed on the property. Grasses commonly observed included Arizona cottontop, green sprangletop, spidergrass, three-awns, cane

beardgrass, side-oats grama, Lehman lovegrass, and slim tridens (SWCA 1996d).

Habitats on this property are considered by the AGFD to be Resource Category III (medium to high resource value for Arizona wildlife species and considered relatively abundant on a statewide basis). Wildlife is expected to be typical of the habitats represented on the property (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Feulner property, or for which the likelihood of occurrence is unknown, are listed in Table 3-34.

3.3.1.4.4 Cultural Resources. The property has not been surveyed for cultural resources, and no sites have been recorded there. However, an unrecorded rock feature and several isolated flaked-lithic artifacts were noted during a reconnaissance of the property (SWCA 1996a). These included several cores and one flake observed on the benches and low hills that flank the primary drainage. The benches are covered by a dense growth of white-thorn acacia, making observation difficult, and it is likely that more artifacts are present than were seen during reconnaissance. The presence of the rock feature and artifacts suggests that additional, archaeologically significant sites are probably present on the Feulner property.

3.3.1.4.5 Socioeconomic Resources. The Feulner property is taxed as Agricultural/Ranch land and generated $103 in property taxes for Pima County in 1999. Phelps Dodge receives $150 annually in grazing fees for this property (Phelps Dodge Corporation 1996).

3.3.2 Optional Package

The optional package of offered lands consists of the following PD-owned properties: Tavasci Marsh, Freeland, Butler-Borg, Norton, Clyne I, and Clyne II. The Tavasci Marsh property borders the National Park Service-administered Tuzigoot National Monument in Yavapai County; the Freeland and Butler-Borg properties are clustered with the Musnicki property adjacent to the Dos Cabezas Mountains Wilderness in Cochise County; and the Clyne I and Clyne II properties, located in Pima County, lie within the Sonoita Valley Acquisition District, as do the Schock and Feulner properties. The Clyne I property also borders the BLM-administered Las Cienegas NCA.

3.3.2.1 Tavasci Marsh Property

This offered property is located approximately two miles east of the community of Clarkdale in Yavapai County, Arizona. The Verde River cuts across the southwestern corner of the 324-acre property, which is composed mostly of undeveloped, flat marshland and the overlooking bluffs. Elevation ranges from 3,300 to 3,800 feet (Zenitech 1998b).

Table 3-34. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Big free-tailed bat	*Nyctinomops macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
San Carlos wild-buckwheat	*Eriogonum capillare*	SR
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassizii*	SS, WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Species Unlikely to Occur		
Acuna cactus	*Echinomastus erectrocentrus acunensis*	C, HS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Bartram's stonecrop	*Graptopetalum bartramii*	SS, SR
Brown pelican	*Pelacanus occidentalis*	E,
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Gentry indigobush	*Dalea tentaculoides*	SS, HS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA

Table 3-34, continued. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Gila chub	*Gila intermedia*	PE, WSCA

Table 3-34, continued. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Gooddings onion	*Allium gooddingii*	CA, HS
Huachuca milk vetch	*Astragalus hypoxylus*	SS
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Kearney's blue star	*Amsonia kearneyana*	E, HS
Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Masked bobwhite	*Colinus virginianus*	E, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican garter snake	*Thamnophis eques*	SS, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	E, HS
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Occult little brown bat	*Myotis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
San Xavier talussnail	*Sonorella macrophallus*	CA
Santa Cruz striped agave	*Agave parviflora ssp. parviflora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonoran pronghorn	*Antilocarpa americana*	E, WSCA
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	C
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cocherell's striate disc	*Discus shemeki cockerelli*	SS

Table 3-34, continued. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Dallhouse spleenwort	*Asplenium (Ceteracach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.1.1 Land Use. The Tavasci Marsh property, which was acquired by PD's predecessors in interest in 1929, encompasses the Tavasci Marsh Habitat Restoration Project, a spring-fed, naturally occurring wetland currently managed by the AGFD per a cooperative agreement with PD. Tuzigoot National Monument, which is managed by the National Park Service, borders on the west,[24] as does privately-owned property. National forest lands managed by the U.S. Forest Service adjoin the property on the east and north. The Verde River Greenway, a six-mile reach of the Verde River managed by Arizona State Parks, and Dead Horse Ranch State Park adjoin the property on the south, in addition to a small section of privately owned property. Figure 2-31 generally shows the property in relation to surrounding land ownership.

AGFD's management objectives for the Tavasci Marsh Habitat Restoration Project are to restore and preserve wetland habitat for wildlife, including threatened and endangered species, and to provide educational and recreational opportunities in the marsh that are compatible with its sensitive nature (Phelps Dodge Development Corporation 1990). Improvements for habitat restoration include two water control structures. Recreational facilities include a hiking trail that leads through the marsh to an observation platform for wildlife and bird watching. Informational signs have been posted around the property. No camping or hunting is allowed on the property.

Tuzigoot National Monument was created to preserve Tuzigoot Ruin, the remnant of a prehistoric Sinaguan Indian pueblo. National Park Service management objectives for the Monument include making the site available to the public and providing interpretive information. The Verde River Greenway is managed to conserve natural resources, preserve cultural resources, and develop recreational opportunities. Tavasci Marsh is located within the 500-year floodplain of the Greenway.

The privately owned property to the west of Tavasci Marsh contains 98-acre Pecks Lake; a nine-hole golf course built in 1925; and the 120-acre, inactive Clarkdale tailing pile (Zenitech 1998b). Land use for several decades has been solely agricultural; however, the property may be developed as a residential community in the future.

The Tavasci Marsh property is accessible via four routes: 1) a gravel road between Pecks Lake and Dead Horse Ranch State Park; 2) a primitive hiking trail along the north bank of the Verde River; 3) a gravel road that approaches the property from the southeast; and 4) a gravel road from Tuzigoot National Monument. The first three routes provide legal public access. The fourth route is usable only by special

[24] The Tavasci Marsh property borders Tuzigoot National Monument but lies within a much larger area defined by the congressionally approved "boundary" of the monument. This boundary does not signify land ownership—it encompasses private and state lands as well as the monument itself—rather it defines an area that Congress believed should comprise an enlarged monument. The National Park Service is authorized to acquire available non-federal land within the approved boundary through purchase, donation, or exchange for inclusion in the monument.

permit from the National Park Service (SWCA 1996c). Wildlife and bird watching are important recreational activities on this property. Hiking opportunities are available as well.

A grazing lease excluding the Tavasci Marsh Habitat Restoration Project has been let for this property. No residential leases, rights-of-way, or other encumbrances are associated with the property. Telephone cables run through portions the property, both above and below ground. Phelps Dodge owns the mineral estate. Phelps Dodge also owns water rights for 806.5 af/yr from Shea Spring for stock watering, municipal, commercial, mining, and wildlife uses (SWCA 1997i). Shea Spring is the principal spring feeding Tavasci Marsh.

No formal visual quality analysis of the property was completed; however, some natural resource elements of the Tavasci Marsh property which define its visual quality include lush green marsh; riparian vegetation; open water; and limestone river terraces that form steep, whitish bluffs overlooking and contrasting with the marsh (SWCA 1996c). No other indications of development are evident on the property. The view to the north and east is dominated by red and gray mesas. Tuzigoot Ruin is visible atop a ridge on the southwestern side of the property, and the historic mining town of Jerome can be seen on a distant mountainside to the west. From certain vantage points on the property, the Verde Valley is visible at the base of the Mogollon Rim to the southeast.

A Phase I Environmental Assessment was performed for the Tavasci Marsh property (Aplomado 1999). Site inspection of the Tavasci Marsh property revealed no indications of dumping of hazardous waste, soil staining, chemical storage containers, or chemical odors. Two abandoned vehicle bodies were observed in the southeastern corner of the property, but no electrical transformers, USTs, ASTs, wells, drywells, potable water sources, or sewage/wastewater systems were indicated from interviews, site reconnaissances, or database reviews conducted for this property. No federal National Priority List site; Arizona WQARF site; or RCRA transport, storage, or disposal facility is located within one mile of this property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property; a closed UST (ID No. AT 9340) is located on the historic dairy farm adjacent to the property. No ERNS sites are located on the property or in the vicinity (Aplomado 1999).

One zipACIDS site, the Phelps Dodge Verde Tailing site (Clarkdale tailing pile),[25] is located about 0.7 mile from the Tavasci Marsh property on the land being considered for future residential development. The majority of stormwater runoff from that land drains into Pecks Lake, which then discharges to Tavasci Marsh, and a smaller amount drains directly into the marsh. To determine if the Verde site's tailing pile was releasing metals into Tavasci Marsh, samples of surface water and sediment from several locations in the marsh were analyzed in 1993 and re-evaluated in 1997. While the test findings showed elevated levels of arsenic and chromium in some samples, elevated concentrations of arsenic found in surface waters and groundwaters throughout the Verde Valley have been attributed to natural leaching from the underlying Verde Formation (Baker et al. 1994).

At the request of the National Park Service, which would ultimately acquire the site from the BLM under the land exchange alternative, further testing was done at Tavasci Marsh to address the potential for ecological risk to aquatic organisms from elevated levels of metals in the marsh sediments. The 1999 report prepared by URS Greiner Woodward Clyde entitled "Tavasci Marsh Supplemental Sampling Report" showed that levels of metals in the sediment of Tavasci Marsh, with one exception, are below benchmarks that would indicate a risk to the organisms in the marsh. The one exception is in a single

[25] This site is listed in the Arizona CERCLA Information and Data System (zipACIDS) as zipACIDS No. 1053, EPA ID No. AZD983475773. Listing means the location is under investigation for possible contamination of soil, surface water, or groundwater.

sediment sample in which arsenic exceeds the benchmark. This exception is, in itself, not indicative of an unsuitable habitat. Tests for toxicity of the sediment and surface water further suggest that conditions in the marsh are not adversely affecting aquatic life.

3.3.2.1.2 Physical Resources. The Tavasci Marsh property is located in part of an abandoned oxbow of the Verde River on portions of the Verde River floodplain and alluvial terraces. The terrain is composed of recent Holocene sand and gravel fluvial deposits within the old riverbed, with Pliocene-to-middle Miocene sediments comprising the floodplain and terraces. These are capped in areas by Quaternary surficial deposits (Zenitech 1998b). The potential for the occurrence of six groups of mineral resources on the Tavasci Marsh property is summarized in Table 3-35. For an explanation of the Mineral Potential Classification System as used in this table see Section 3.2.2.3.2 of this document.

Table 3-35. Summary of Mineral Potential of the Tavasci Marsh Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	C
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Moderate	B

Source: D.E. Wahl 1997b

3.3.2.1.3 Biological Resources. Vegetation on the site has been categorized as belonging to five different vegetation associations and one disturbed habitat, all of which intergrade with each other (SWCA 1996d). These vegetation associations are as follows:

- Sonoran Interior Marshland, *Typha domingensis* Association, with a variety of other wetland plants (bulrush, sedges, spikerushes, and willow) mixed in with the cattails and including areas of open water, with submergent and floating plants;
- Cottonwood-Willow Association (Fremont cottonwood-Goodding willow);
- Mesquite-Hackberry Association;
- Sonoran Riparian Woodland;
- Crucifixion Thorn-Juniper-Creosotebush Association on the limestone terrace above the marsh; and
- Disturbed areas impacted by drainage, grazing, or other human activities, but that are recovering to become marshland, mesquite or cottonwood-willow woodland.

Tavasci Marsh is a popular place for bird watching. More than 110 species of birds have been recorded from the marsh, including several species of marsh-dependent birds and riparian-obligate birds likely to nest or summer there. Species dependent upon the marsh and associated riparian woodland habitats that were observed during reconnaissance of the property in 1996 included yellow-billed cuckoo, great blue heron,

black-crowned night heron, northern harrier, white-faced ibis, yellow warbler, yellow-breasted chat, pied-billed grebe, mallard, green-winged teal, sora, common moorhen, American coot, common yellowthroat, red-winged blackbird, lesser goldfinch, and song sparrow (SWCA 1996d). Also seen were birds that frequent the adjacent upland communities or roost in trees at the edge of the marsh including red-tailed hawk, Cooper's hawk, barn owl, great horned owl, cactus wren, Bewick's wren, rock wren, northern rough-winged swallow, turkey vulture, Gambel's quail, mourning dove, white-winged dove, greater roadrunner, black-chinned hummingbird, Gila woodpecker, ladder-backed woodpecker, black phoebe, Say's phoebe, ash-throated flycatcher, western kingbird, vermillion flycatcher, verdin, northern mockingbird, Bell's vireo, summer tanager, western tanager, northern cardinal, blue grosbeak, canyon towhee, Abert's towhee, rufous-crowned sparrow, black-throated sparrow, great-tailed grackle, house finch, and brown-headed cowbird. The endangered Yuma clapper rail has been reported from Tavasci Marsh, and the endangered southwestern willow flycatcher has been known to nest there and along the Verde River near the property. Bald eagles and peregrine falcons are known to forage in the vicinity. AGFD rates this property as Resource Category I habitat. Habitats in this category are of the highest value to Arizona wildlife species and are unique and/or irreplaceable on a statewide or regional basis. The National Audubon Society designated Tavasci Marsh and neighboring riparian habitat as the first "Important Bird Area" in the State of Arizona.

The special interest species identified by federal and state agencies that are known to occur, may occur, or are unlikely to occur on the Tavasci Marsh property, or for which the likelihood of occurrence is unknown, are listed in Table 3-36. The portion of the Verde River and its 100-year floodplain on the property is designated critical habitat for the razorback sucker, spikedace, and loach minnow. Areas of the Verde River from Sob Canyon to its inflow into Horseshoe Reservoir, including Tavasci Marsh and Ister Flat, are designated critical habitat for the southwestern willow flycatcher.

Table 3-36. Special Interest Species Potentially Occurring on the Tavasci Marsh Property, Yavapai County, Arizona

Species' Common Name	Scientific Name	Status*
Species That Are Known to Occur		
Osprey	*Pandion haliaetus*	WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Yuma clapper rail	*Rallus longirostris yumanensis*	E, WSCA
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American bittern	*Botaurus lentiginosus*	WSCA
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona cliff rose	*Purshia subintegra*	E, HS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Big free-tailed bat	*Nyctinompos macrotis*	SS
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA

Fringed myotis	*Myotis thysanodes*	SS

Table 3-36, continued. Special Interest Species Potentially Occurring on the Tavasci Marsh Property, Yavapai County, Arizona

Species' Common Name	Scientific Name	Status*
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gila chub	*Gila intermedia*	PE, WSCA
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Long-legged myotis	*Myotis volans*	SS
Lowland leopard frog	*Rana yavapaiensis*	WSCA
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican garter snake	*Thamnophis eques*	WSCA
Page springsnail	*Pyrgulopsis morrisoni*	C, WSCA
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Ripley wild-buckwheat	*Eriogonum ripleyi*	SR
Small-footed myotis	*Myotis ciliolabrum*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Verde Valley sage	*Salvia dorrii mearnsii*	SR
Roundtail chub	*Gila robusta*	WSCA
Western red bat	*Lasiuris blossevillii*	WSCA
White-faced ibis	*Plegadis chihi*	SS
Species That Are Unlikely to Occur		
Arizona agave	*Agave arizonica*	E, HS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Colorado pikeminnow	*Ptchocheilus lucius*	E, WSCA
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Kofa Mountain barberry	*Berberis harrisoniana*	SS
Loach minnow	*Tiaroga cobitis*	T, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Murphey agave	*Agave murpheyi*	SS
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS

Table 3-36, continued. Special Interest Species Potentially Occurring on the Tavasci Marsh Property, Yavapai County, Arizona

Species' Common Name	Scientific Name	Status*
Sonoran desert tortoise	*Gopherus agassizii*	SS
Speckled dace	*Rhinichthys osculus*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Species for Which Likelihood of Occurrence is Unknown		
Arizona skink	*Eumeces gilberti arizonensis*	SS, WSCA
Arizona Sonoran rosewood	*Vauguelinia californica ssp. sonorensis*	SS
California flannelbush	*Fremontodendron californica*	SS, SR
MacNeil sooty wing skipper	*Hesperopsis gracielae*	SS
Schott wire-lettuce	*Stephanomeria schottii*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.1.4 Cultural Resources. The Tavasci Marsh property contains multiple archaeological sites, both prehistoric and historic, that are eligible to the *National Register of Historic Places*. Although the property was surveyed in 1986, a recent visit suggests that additional archaeological sites can be located and characterized (SWCA 1996a).

The cultural history of the Tavasci Marsh area is fairly well known because of research at Tuzigoot National Monument. Hohokam farmers colonized the valley by A.D. 800, but by A.D. 1125 were displaced by the Sinagua. Tuzigoot Pueblo was started just before A.D. 1000 and was occupied until about A.D. 1425. By the time the Spanish first explored the Verde Valley, the Yavapai and the Tonto Apache had settled in the area. By the 1860s, Euroamericans began settling the valley, and within a decade the Native American population had been pushed out. In the 1880s, the copper boom at Jerome heralded the start of the intensive settlement of the valley (SWCA 1996a).

3.3.2.1.5 Socioeconomic Resources. In 1999, this property, taxed as Vacant Land, generated property taxes of $2,629 for Yavapai County. The existing grazing lease associated with portions of this property generates $300 per month for PD (Phelps Dodge Corporation 1996).

3.3.2.2 Freeland Property

This property consists of three physically separate parcels (identified as the West, North, and East parcels in Figure 2-32) totaling 140 acres in the eastern foothills of the Dos Cabezas Mountains in Cochise County, Arizona. The West parcel is located in the mouth of Happy Camp Canyon roughly 1.5 to 1.75 miles west of the other two parcels. Elevations on this parcel range from 4,480 to 4,640 feet. The East and North parcels, about 0.6 mile apart, lie outside the mouth of the Canyon on the alluvial fan that forms the upper slope of the San Simon Valley. Elevations on the East parcel, which includes a rocky ridge, range from less than 4,100 to about 4,240 feet. Elevations on the gently sloping North parcel range only from 4,100 to 4,180 feet. Happy Camp Wash, which runs through the West parcel, is the major drainage in the area. The three parcels are sufficiently similar in most characteristics to be discussed as one property, except when a specific resource occurs on only one or two of the parcels. In such cases, the

parcels on which the resources occur are identified individually.

3.3.2.2.1 Land Use. All three Freeland parcels are located within the Dos Cabezas LTMA in the Safford Field Office (BLM 1991). The West Parcel is nearly surrounded by the Dos Cabezas Mountains Wilderness but does not adjoin the Wilderness at any point. Other privately owned properties, including the Butler-Borg property and lands offered for exchange in other proposed actions, intervene. The East and North parcels are within 0.25 and 0.5 mile of the Wilderness, respectively. The Dos Cabezas Mountains Wilderness is managed to provide for the long-term protection and preservation of the area's wilderness character. Within that context, the BLM manages a variety of resource values, including wildlife habitat, vegetation, visual resources, cultural resources, dispersed recreation, and livestock grazing (SWCA 1996c). Figure 2-32 shows the parcels in relation to surrounding land ownership.

Primary access to the three parcels is via Happy Camp Canyon Road off Apache Pass Road leading south out of the community of Bowie. This dirt road, a two-wheel-drive road as far as the Indian Bread Rocks Picnic Area and a four-wheel-drive road beyond, follows alongside Happy Camp Wash through East and West parcels. It provides one of two access points to the northern and central portions of the Dos Cabezas Mountains Wilderness. Short spur roads lead toward the North parcel, but public access is not currently authorized for these roads. No other roads or trails are evident (SWCA 1996c).

Because these parcels are privately owned, no public recreational uses are authorized. As these parcels provide access to the central portion of the Dos Cabezas Mountains Wilderness, potential recreational uses of the parcels include, but are not limited to, hunting, hiking, camping, picnicking, and bird and wildlife watching (ibid.). Vehicle use would be permitted on the property but restricted to existing roads and trails.
The Freeland property is adjacent to or part of the BLM's Happy Camp grazing allotment. Currently PD has let a grazing lease and associated road easement to this land (Phelps Dodge Corporation 1996). The property is partially fenced for livestock control, and water is available for livestock. No utilities easements, residential leases, rights-of-way, or other legal agreements encumber these parcels. Phelps Dodge owns the mineral estate on 60 acres, and the remaining acres are federal reserve minerals (ibid.). No surface water rights have been filed for this property.

No formal visual quality analysis was completed for the Freeland property; however, some natural resource elements of the parcels that define visual quality include distinct upland and xeroriparian vegetation, rock outcrops, the large arroyo of Happy Camp Wash, and silhouettes of the surrounding rolling hills. North Parcel affords a long view of the San Simon Valley and Peloncillo Mountains (SWCA 1996c). Human modifications are limited to a functioning windmill and adjacent large, rusted, metal water tank in the West parcel (Zenitech 1998b). If acquired by the BLM, the North and East Parcels would fall within VRM Class IV, and the West Parcel would fall within VRM Class III. The management objective of Class IV is to provide for management activities that require major modification of the existing character of the landscape. The level of change can be high, but the visual impact of alterations should be minimized through careful location and minimal disturbance and by repeating the basic elements. The objective of Class III is to *partially retain* the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. The nearby Dos Cabezas Mountains Wilderness is categorized as VRM Class I, in which the objective is to preserve the existing character of the landscape by allowing only very limited management activity. The level of change should be very low and it must not attract attention.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Freeland property. No LUST sites or

open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.2.2 Physical Resources. The underlying surficial geology of the Freeland property consists of early Miocene to Oligocene granitoid rocks, overlying middle Proterozoic granitoid and metamorphic rocks (Zenitech 1998b). Relatively fine-grained colluvial and alluvial material derived from these parent rocks form the alluvial fan. The potential for occurrence of mineral resources on this property is summarized in Table 3-37.

Table 3-37. Summary of Mineral Potential of the Freeland Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Metallic Minerals	Low	C
Non Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Moderate	B

Source: D.E. Wahl 1997b

3.3.2.2.3 Biological Resources. Vegetation on the flatter terrain of the West and East parcels includes mesquite, catclaw acacia, and burro brush, which combine to form a sparse xeroriparian association. Other prominent species include velvet ash, netleaf hackberry, Emory oak, and gray oak trees and mesquite, catclaw acacia, wolfberry, seep-willow, and burro brush shrubs. Vegetation in the upland portions of the West parcels is intermediate between Interior Chaparral and Sonoran Desertscrub, and includes mesquite, prickly pear, Palmer agave, catclaw acacia, turpentine-bush, fairyduster, sotol, and juniper. The rocky ridge extending onto the East parcel has vegetation intermediate between Interior Chaparral and Sonoran Desertscrub, including sotol, Palmer agave, ferns of several species, scrub oak, squaw bush, side-oats grama grass, and bullgrass. Vegetation on the open North parcel is a relatively homogeneous mixture of shrubby mesquite, catclaw acacia, snakeweed, and various grasses (SWCA 1996d).

Wildlife species observed on the Freeland property include mule deer, canyon towhee, Scott's oriole, house finch, cactus wren, black-throated sparrow, desert cottontail, black-tailed rattlesnake, eastern fence lizard, desert spiny lizard, ladder-backed woodpecker, greater roadrunner, cactus wren, northern cardinal, and Gambel's quail. On the West parcel, the windmill provides water for wildlife as well as livestock, and numerous large rocks with crevices and overhangs provide shelter (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Freeland property, or for which the likelihood of occurrence is unknown, are listed in Table 3-38.

Table 3-38. Special Interest Species Potentially Occurring on the Freeland Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*

Species That May Occur

American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Big free-tailed bat	*Nyctinompos macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS

Table 3-38, continued. Special Interest Species Potentially Occurring on the Freeland Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Fringed myotis	*Myotis thysanodes*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pinaleño hedgehog cactus	*Echinocereus ledingii*	SR
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Species Unlikely to Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Aravaipa sage	*Salvia amissa*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Beautiful shiner	*Cyprinella formosa*	T, WSCA
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Long-legged myotis	*Myotis volans*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mountain plover	*Charadrius montanus*	PT
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	T, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Peebles bluestar	*Amsonia peeblesii*	SS
Ramsey Canyon leopard frog	*Rana subaquavocalis*	CA, WSCA

Table 3-38, continued. Special Interest Species Potentially Occurring on the Freeland Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
White-faced ibis	*Plegadis chihi*	SS
Whooping crane	*Grus americana*	E
Yaqui catfish	*Ictalurus pricei*	T, WSCA
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	E, WSCA
Yaqui chub	*Gila purpurea*	E, WSCA
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.2.4 Cultural Resources.

< **West Parcel.** Based on a check of ASM files, no systematic surveys have been done on or within one mile of the West parcel, but two sites have been recorded within one mile of the parcel boundary. AZ CC:14:18 (ASM) consists of petroglyphs and pictographs on five panels in the local granite outcrops. Also present are bedrock mortars, metate fragments, and flaked stone. The second site, AZ CC:14:21 (ASM), is a rock shelter with a spring, pictographs, two bedrock mortars, a mano fragment, and flaked stone. The age and affiliation of the sites could not be determined. Both site cards indicate that additional small sites are in the area; however, a recent, brief inspection of the parcel failed to locate any archaeological sites (SWCA 1996a).

< **East and North Parcels.** Two systematic surveys have been completed within one mile of these parcels: one in 1982 (Powers Elevation 1982) and the other in 1981 and 1994 (Bromley 1981;

Woodall 1994). Between these two surveys and miscellaneous studies, nine prehistoric sites and one historical site have been recorded within one mile of the parcels. The prehistoric sites include the two rock art sites described above; two additional rock art sites; two lithic scatters (each comprising several hundred artifacts); two sites containing lithic artifacts, sherds, and rock alignments; and one containing a roasting pit, rock shelters, bedrock mortars, rock alignments, lithic artifacts, sherds, and Euroamerican trash dating from the early 1900s. Salado polychrome sherds found at two of the sites suggest that those locations were occupied between A.D. 1300 and 1450. The historical site consisted of traces of a wooden building and Euroamerican trash dating from the early 1900s. Woodall (1994, p.3) remarks that "Several historic roads, which include the Fort Grant-Fort Bowie Road and the Pueblo Viejo-Fort Bowie Road" are present in this area, but that survey was unable to locate the roads on the ground; such long-abandoned roads may need to be documented with the help of remote sensing imagery (SWCA 1996a).

During a recent field visit, three isolated lithic artifacts were found on the North parcel and three historical sites and a hand-dug well were found on the East parcel. The historical remains are probably parts of a single large ranch complex that appears to be eligible for the *National Register of Historic Places*. The archaeological potential of the East parcel appears to be high, and the other two parcels are likely to include additional sites as well (SWCA 1996a).

3.3.2.2.5 Socioeconomic Resources. The Freeland property is taxed as Vacant Land and generated $579 in property taxes for Cochise County in 1999. The current grazing lease generates about $100/lease-year for PD (Phelps Dodge Corporation 1996).

3.3.2.3 Butler-Borg Property

This property consists of 308 acres in lower Happy Camp Canyon at the eastern edge of the Dos Cabezas Mountains in Cochise County, Arizona. It lies about a tenth of a mile west of the Freeland West parcel. Straddling Happy Camp Wash, the Butler-Borg property covers the canyon bottom and portions of the rocky, granite slopes on either side. Elevation ranges from 4,500 to 5,400 feet. Curtis Spring is located just east of the property.

3.3.2.3.1 Land Use. The Butler-Borg property borders the 11,998-acre Dos Cabezas Mountains Wilderness, which lies to the north, south, and west. It is also within the perimeter of a designated LTMA in the Safford Field Office (BLM 1991). The boundary of the property totals three miles, of which two miles (67 percent) adjoins the Wilderness. The remaining one mile (or 33 percent) adjoins other private lands that are proposed for BLM acquisition in another land exchange (SWCA 1996c). Figure 2-32 shows the property in relation to surrounding land ownership.

This property is accessible via the Happy Camp Canyon Road, a partly two-wheel-drive, partly four-wheel-drive dirt road off Apache Pass Road leading south out of the town of Bowie, Cochise County, Arizona. This road, which parallels Happy Camp Wash through the property, provides one of two access routes to the northern and central portions of the Dos Cabezas Mountains Wilderness. The road is washed out by Happy Camp Wash immediately east of the property, but continues as a passable dirt road/trail after the washout (SWCA 1996c).

Because the property is privately owned, no public recreational uses are authorized. As this property provides access to the central portions of the Dos Cabezas Mountains Wilderness, potential recreational uses of the property include, but are not limited to, hunting, hiking, camping, picnicking, and bird and wildlife watching. Vehicular use would be permitted but restricted to roads and trails. The property does not include, affect, or lie in the watershed of any river segments proposed for Wild and Scenic River

designation (ibid.).

The Butler-Borg property is adjacent to the BLM's Happy Camp grazing allotment. Currently PD leases the property for grazing purposes only; the lessee is not permitted to encumber the lease without PD's consent (Phelps Dodge Corporation 1996). The property is at least partially fenced for livestock control, and water is available for livestock. No utilities easements, residential leases, rights-of-way, or other encumbrances are associated with this property. Minerals are reserved by the federal government. No surface water rights have been filed for this property.

No formal visual quality analysis was completed for this property; however, natural resource elements that define its visual quality include distinct upland and xeroriparian vegetation, rock outcrops, the large arroyo of Happy Camp Wash, and silhouettes of the surrounding rolling hills (SWCA 1996c). According to the Safford District RMP (BLM 1991), public lands in the area (other than the Dos Cabezas Mountains Wilderness) have been categorized as VRM Class III. If acquired by the BLM, the Butler-Borg property would fall within this classification as well. The objective of Class III is to *partially retain* the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. The adjoining Wilderness is categorized as VRM Class I, in which the objective is to preserve the existing character of the landscape by allowing only very limited management activity. The level of change should be very low and it must not attract attention.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Butler-Borg property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.3.2 Physical Resources. The underlying surficial geology of the Butler-Borg tract consists of early Miocene to Oligocene granitoid rocks, overlying middle Proterozoic granitoid and metamorphic rocks (Zenitech 1998b). The potential for occurrence of mineral resources on this property is summarized in Table 3-39.

Table 3-39. Summary of Mineral Potential of the Butler-Borg Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Metallic Minerals	Low	B
Non Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Moderate	B

Source: D.E. Wahl 1997b

3.3.2.3.3 Biological Resources. Vegetation on the Butler-Borg property is clearly divided into distinctive xeroriparian and upland communities, with most of the property being upland. Xeroriparian vegetation includes sycamore, Arizona walnut, netleaf hackberry, Arizona cottontop, canyon grape, desert willow,

desert broom, velvet ash, mesquite, and catclaw acacia. Upland vegetation is intermediate between the Sonoran Desertscrub community and the Interior Chaparral plant community, containing species characteristic of both. These species include mesquite, catclaw acacia, beargrass, ocotillo, manzanita, sotol, fairyduster, lovegrass, snakeweed, barrel cactus, prickly pear, hedgehog cactus, cane cholla, Palmer agave, wolfberry, banana yucca, squaw bush, Lehmann lovegrass, sumac, scrub oak, Emory oak, and juniper. Juniper becomes abundant toward the top of the north-facing slope, which may be considered a *Juniperus coahuilensis* Association. The most abundant species in both associations, and the dominant plant on the property, is mesquite, which appears there in the form of a shrub generally less than six feet tall (SWCA 1996d).

Wildlife species or sign observed during a recent site visit included mule deer, coyote, Harris' antelope squirrel, desert cottontail, pocket gopher, white-throated woodrat, cactus wren, turkey vulture, rock wren, canyon towhee, northern mockingbird, house finch, black-throated sparrow, Gambel's quail, and Scott's oriole, and diamondback rattlesnake (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Butler-Borg property, or for which the likelihood of occurrence is unknown, are listed in Table 3-40.

3.3.2.3.4 Cultural Resources. Based on a check of ASM files check, no systematic surveys are known to have been conducted on or within one mile of the Butler-Borg property. The one site recorded within one mile of the parcel, AZ CC:14:18 (ASM), is a rock art site previously described in the section on the Freeland property. Based on a limited field reconnaissance of the Butler-Borg property (SWCA 1996a), at least one archaeological site (a historical ranching site) occurs there. This site appears to be eligible for the *National Register of Historic Places*. The presence of AZ CC:14:18 (ASM) near the parcel, in a physical setting that characterizes much of the property suggests that Native American rock art may be present on the property as well. The location of the property in a major canyon of the Dos Cabezas Mountains, within a short distance of a spring, further increases the likelihood of important archaeological sites on this property (SWCA 1996a).

Table 3-40. Special Interest Species Potentially Occurring on the Butler-Borg Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Big free-tailed bat	*Nyctinompos macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Fringed myotis	*Myotis thysanodes*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pinaleño hedgehog cactus	*Echinocereus ledingii*	SR

Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS

Table 3-40, continued. Special Interest Species Potentially Occurring on the Butler-Borg Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Species Unlikely to Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Beautiful shiner	*Cyprinella formosa*	T, WSCA
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Canelo Hills ladies' tresses	*Spiranthes delitescens*	E, HS
Chuckwalla	*Sauromalus obesus*	SS
Cochise pincushion cactus	*Coryphantha robbinsorum*	T, HS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Ferruginous hawk	*Buteo regalis*	SS, WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Gila chub	*Gila intermedia*	PE, WSCA
Huachuca spring snail	*Pyrgulopsis thompsoni*	C
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Lemmon fleabane	*Erigeron lemmonii*	C, HS
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mountain plover	*Charadrius montanus*	PT
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	T
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Peebles bluestar	*Amsonia peeblesii*	SS
Ramsey Canyon leopard frog	*Rana subaquavocalis*	CA, WSCA
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS

Table 3-40, continued. Special Interest Species Potentially Occurring on the Butler-Borg Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
White-faced ibis	*Plegadis chihi*	SS
Whooping crane	*Grus americana*	E
Yaqui catfish	*Ictalurus pricei*	T, WSCA
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	E, WSCA
Yaqui chub	*Gila purpurea*	E, WSCA
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.3.5 Socioeconomic Resources. The Butler-Borg property, taxed as Vacant Land, generated $658 in property taxes for Cochise County in 1999. Currently, the grazing lease on this property generates $100/lease-year for PD (Phelps Dodge Corporation 1996).

3.3.2.4 Norton Property

Totaling 400 acres, the Norton property consists of two separate parcels located less than 0.75 mile from each other on Black Rock Wash in Graham County, Arizona. Elevations on the property, which encompasses portions of the wash and its sparsely vegetated floodplain, range from 3,000 to 3,100 feet. Black Rock Wash is an ephemeral tributary of the Gila River, draining eastward from the Santa Teresa Mountains.

3.3.2.4.1 Land Use. This property, which has a total boundary of about five miles, is surrounded entirely by public lands administered by the BLM. The western-most property boundary lies about 0.25 mile east of the San Carlos Apache Reservation. Figure 2-33 shows the location of the Norton property in relation to surrounding land ownership.

The property is physically and legally accessible from the east via an unpaved portion of the Black Rock Wash Road off of Highway 70. Access from the west is by unimproved roads leading from the San Carlos Apache Reservation. Visitors must contact the Tribe to obtain the necessary permits required to cross the reservation. The Norton property is privately owned and no recreational activities are authorized; however, evidence of off-highway vehicle use is apparent. Potential dispersed recreational uses of the property include, but are not limited to, hiking, picnicking, quail hunting, backcountry driving, and bird and wildlife watching. This property is located within the BLM's Southwest Gila Valley LTMA. It does not include or adjoin any river segments determined by the BLM and the Department of the Interior to be eligible or suitable for Wild and Scenic Rivers designation (BLM 1994a).

Phelps Dodge has let a month-to-month grazing lease to the Norton property, which was once part of the Norton family ranch. Other than the grazing lease, no other encumbrances are associated with this property. Phelps Dodge owns the mineral estate (Phelps Dodge Corporation 1996). The Arizona State Land Department has filed one surface water right for 0.3 af/yr from Black Rock Wash for stock watering and wildlife use on this property.

Landscape on the Norton property consists of a dry, shallow, sandy watercourse of Black Rock Wash; its broad, relatively level floodplain; and low hills and bluffs south of the floodplain. Stands of mesquite, desert willow, Arizona black walnut, and other riparian and xeroriparian trees and shrubs growing along the wash provide the property's dominant visual interest (SWCA 1996c). Corrals, a stock tank, and a windmill are present, but no buildings or other evidence of development can be seen (Zenitech 1998b). A formal visual quality analysis has not been completed for the Norton property; however, adjacent public lands within this area have been designated as VRM Class IV (BLM 1991). The management objective of Class IV is to provide for management activities that require major modification of the existing character of the landscape. Such activities may dominate the view and be the major focus of viewer attention. The level of change can be high, but the visual impact of the change should be minimized through careful location and minimal disturbance and by repeating the basic elements.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Norton property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.4.2 Physical Resources. The Norton property is composed primarily of fluvial sediments overlying Pliocene to middle Miocene sedimentary rocks. The sedimentary rocks consist of pans of the Bidahochi Formation and the Bouse Formation with patches of Quaternary surficial deposits acting as caprock (Zenitech 1998b). The potential for occurrence of mineral resources on this property is summarized in Table 3-41.

3.3.2.4.3 Biological Resources. The dominant plant on the Norton property is mesquite, many of which are very large, mature specimens growing along Black Rock Wash. Other species present include narrow-leaved yucca, rabbitbrush, catclaw acacia, creosote, desert broom, and prickly pear cacti. Trees of note on the property include mature individuals of sycamore, Arizona ash, black walnut, and desert willow. Although a riparian zone is not clearly defined, almost the entire property lies on the wash floodplain and has vegetation characteristic of an old, somewhat degraded mesquite bosque. Most larger mesquite trees have been partially harvested for wood at some time in the past, but they continue to grow well, with some exceeding 30 feet in height. The property has potential for recovery to a classic mesquite bosque (SWCA 1996d).

Table 3-41. Summary of Mineral Potential of the Norton Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Moderate	B
Locatable Metallic Minerals	Low	C
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	C

Source: D.E. Wahl 1997b

Wildlife or sign of wildlife observed during a recent field visit by biologists included collared peccary, coyote, mule deer, Harris' antelope squirrel, white-throated woodrat, desert cottontail, black-tailed jackrabbit, dark-eyed junco, black-throated sparrow, white-crowned sparrow, common raven, phainopepla, Gambel's quail, red-tailed hawk, verdin, golden eagle, Harris' hawk, northern oriole, Cooper's hawk, crissal thrasher, Bewick's wren, ladder-backed woodpecker, house finch, Abert's towhee, Gila woodpecker, and pyrrhuloxia (SWCA 1996d). Overall, the wildlife present on the property is expected to be typical of the habitats present. The USFWS and AGFD have reported that no federal or state listed or proposed threatened or endangered species were found in their databases for this area (SWCA 1996d). The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Norton property, or for which the likelihood of occurrence is unknown, are listed in Table 3-42.

3.3.2.4.4 Cultural Resources. The Norton property has not been systematically surveyed for cultural resources. The ranching facilities mentioned above were noted during a recent archaeological reconnaissance of the property, but no evidence was seen to suggest that they are historic in age (SWCA 1996a). No Prehistoric period sites were observed during the reconnaissance, which focused on the bluffs in the southern part of the property.

3.3.2.4.5 Socioeconomic Resources. This property, taxed as Agriculture/Ranch land, generated $24 in private property taxes for Graham County in 1999. Phelps Dodge has leased the property back to the Norton family for grazing for $18/lease-year (Phelps Dodge Corporation 1996).

3.3.2.5 Clyne I Property

This 160-acre property is located on the western flank of the Whetstone mountains about 14 miles northeast of the community of Sonoita in Pima County, Arizona. It is the remaining portion of a 240-acre property originally included as offered lands in the proposed Morenci Land Exchange between the BLM and PD. For that project, only an 80-acre portion of the original property was approved for exchange as part of the Preferred Action Alternative. The Clyne I property considered for this exchange encompasses portions of Bear Spring Canyon and the ridge between that canyon and Shellenberger Canyon to the north. Elevations range between 4,720 and about 5,000 feet. Drainage is to the northwest via a wash in Bear Spring Canyon, then in Mattie Canyon to Cienega Creek (SWCA 1996c).

Table 3-42. Special Interest Species Potentially Occurring on the Norton Property, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Big free-tailed bat	*Nyctinomops macrotis*	SS, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Loggerhead shrike	*Lanius ludovicianus*	SS
Long-legged myotis	*Myotis volans*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Species Unlikely to Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Apache trout	*Onchorhynchus apache*	T, WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Arizona cliffrose	*Purshia subintegra*	E, HS
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gila chub	*Gila Intermedia*	PE, WSCA
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Sonoran desert tortoise	*Gopherus agassizii*	SS

Table 3-42, continued. Special Interest Species Potentially Occurring on the Norton Property, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mount Graham red squirrel	*Tamiasciurus hudsonicus grahamensis*	E, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Peebles bluestar	*Amsonia peeblesii*	SS
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catostomus insignis*	SS
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinicthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculata*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Wet canyon talussnail	*Sonorella macrophallus*	CA
White-faced ibis	*Plegadis chihi*	SS
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.5.1 Land Use. The Clyne I property is located in what was formerly known as the Empirita Ranch. It is adjacent to private and BLM lands and within the perimeter of the 100,800-acre Sonoita Valley Acquisition Planning District (consisting of state, private, and BLM land). One mile of the property's four miles of boundary abuts the Las Cienegas NCA. Figure 2-34 shows the location of the property in relation to surrounding land ownership.

The property is physically accessible via a four-wheel-drive, gravel road off Highway 82, east of Sonoita.

Visitors to the property must travel approximately seven miles north of Highway 82 across private, state, USFS, and BLM lands. Public access is currently authorized across USFS and BLM lands but not across state and private land. Application would have to be made to the Arizona State Land Department to authorize public use of the road, and permission would have to be obtained from any private landowner whose property is crossed. Because the property is privately owned, no recreational uses are authorized. Potential dispersed recreational uses of the property may include, but are not limited to, hunting, hiking, camping, picnicking, backcountry driving on selected roads and routes, and bird and wildlife watching. The property is within the watershed of a segment of Cienega Creek that the BLM and the Department of the Interior have recommended for Wild and Scenic Rivers designation (ibid.).

PD has let a grazing lease to the Clyne I property, but no utilities easements, rights-of-way, or residential leases otherwise encumber the land. Minerals are reserved by the federal government. Phelps Dodge owns one surface water right for 2.0 af/yr from Bear Spring Canyon for stock watering.

No formal visual quality analysis was completed for this property; however, some natural resource elements that define its visual quality include an ephemeral wash, a northwest-to-southeast-trending ridge (or hogback) formed in a sequence of limestone beds that dip steeply to the south, rock outcrops, and distinct upland and xeroriparian vegetation. Rolling hills surround the property. No human-made structures or other indications of development are present (SWCA 1996c). Visual resource management objectives for the neighboring Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most public land in the planning area will be managed for the objectives of VRM Class II.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Clyne I property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.5.2 Physical Resources. The geology underlying the Clyne I property consists of Paleozoic and Mesozoic (Cretaceous) sedimentary rocks and some Cretaceous volcanic rocks in steeply tilted, overlapping layers. The potential for occurrence of mineral resources on this property is summarized below in Table 3-43.

3.3.2.5.3 Biological Resources. The grassland of the Las Cienegas NCA and surrounding area is "one of the finest examples of Plains grassland in the Southwest" (Pima County Department of Transportation and Flood Control District 1992). AGFD noted during their visit to this area that uplands were "in good condition [and] supported a variety of native grasses" (AGFD 1994). In addition to these native grasses, upland vegetation observed during a recent field reconnaissance by biologists included numerous shrubs and small trees, such as mesquite, fairyduster, ocotillo, Palmer agave, shindaggers, catclaw acacia, wait-a-minute bush, desert spoon, beargrass, buckwheat, silktassel, Emory oak, Mexican cliffrose, juniper, desert sumac, and numerous species of cacti. Several small dense stands of mortonia, an uncommon species reaching its western-most limits in southeastern Arizona, were seen as well (SWCA 1996c).

Vegetation along Bear Spring Canyon Wash is representative of xeroriparian drainages in southeastern Arizona, in which species composition is similar to that of the uplands, except with general greater density and volume of vegetation. No acreage estimate was made of xeroriparian plants (SWCA 1996c).

Wildlife or sign observed on the property during site reconnaissance included mule deer, desert cottontail, blacktailed jackrabbit, coyote, woodrat, javelina, several species of lizard, whitewinged dove, black-throated sparrow, Gambel's quail, eastern meadowlark, and others (SWCA 1996c). Small caves,

crevices, and rock outcrops on the property provide numerous shelter sites for wildlife, including bats and carnivores. Grassland portions of the Las Cienegas NCA are known to support small herds of pronghorn (BLM 1991). AGFD categorized habitats on the property as Resource Category III, "of high to medium value for Arizona wildlife species and are relatively abundant on a statewide basis" (AGFD 1994).

Table 3-43. Summary of Mineral Potential of the Clyne I Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	C

Source: D.E. Wahl 1997b

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Clyne I property, or for which the likelihood of occurrence is unknown, are listed in Table 3-44.

3.3.2.5.4 Cultural Resources. The property has not been surveyed for cultural resources, and no sites had been recorded there before archaeologists conducted a reconnaissance in 1995 (SWCA 1996a). During that visit, one or perhaps more sites were identified. Flaked-lithic artifacts were noted at several points over a distance of several hundred feet along the central ridge. These Prehistoric artifact scatters represent the flaking of a dark raw material found on the ridge. A more thorough examination will be required to determine whether the scatters should be recorded as one or a sequence of sites. A rock-pile feature was also noted south of the ridge; this feature may warrant site status.

Considering the presence within the property of an extensive, archaeologically significant flaked lithic scatter and a diverse plant community that might have been attractive to prehistoric and historic gatherers, it appears likely that additional significant sites are present in the area (SWCA 1996a).

3.3.2.5.5 Socioeconomic Resources. This property, taxed as Vacant Land, generated $97 in private property taxes for Pima County in 1999. A current grazing lease generates $100/lease-year for PD (Phelps Dodge Corporation 1996).

3.3.2.6 Clyne II Property

This 400-acre property is located at the base of the Whetstone Mountains in Pima County, approximately 0.75 mile south of the Clyne I property. Elevations range from 4,900 to 5,200 feet. Mud Spring Canyon bisects the property. Groundwater surfaces at places in the canyon to produce ponds, at least one of which appears to be perennial (SWCA 1996d). Both Mud Spring Canyon and Spring Water Canyon, which cut diagonally through the center and northwestern corner of the property, respectively, drain into Cienega Creek.

Table 3-44. Special Interest Species Potentially Occurring on the Clyne I Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Big free-tailed bat	*Nyctinomops macrotis*	SS, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
San Carlos wild-buckwheat	*Eriogonum capillare*	SR
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassiz*	SS, WSCA
Species Unlikely to Occur		
Acuna cactus	*Echinomastus erectrocentrus acunensis*	C, HS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Bartram's stonecrop	*Graptopetalum bartramii*	SS, SR
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Ferruginous hawk	*Buteo regalis*	WSCA
Gentry indigobush	*Dalea tentaculoides*	SS, HS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gila chub	*Gila intermedia*	PE, WSCA
Gooddings onion	*Allium gooddingii*	CA, HS
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Huachuca milk vetch	*Astragalus hypoxylus*	SS, SR
Kearney's blue star	*Amsonia kearneyana*	E, HS

Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Masked bobwhite	*Colinus virginianus*	E, WSCA

Table 3-44, continued. Special Interest Species Potentially Occurring on the Clyne I Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican garter snake	*Thamnophis eques*	WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Mountain plover	*Charadrius montanus*	PT
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	E, HS
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Occult little brown bat	*Myotis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
San Xavier talussnail	*Sonorella macrophallus*	CA
Santa Cruz striped agave	*Agave parviflora ssp. parviflora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonoran pronghorn	*Antilocarpa americana*	E, WSCA
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	C
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cockerell's striate disc	*Discus shemeki cockerelli*	SS
Dalhouse spleenwort	*Asplenium (Ceteracach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.6.1 Land Use. The property lies within the boundary of the Las Cienegas NCA. Addition of this

property would represent a 0.8 percent increase in total area of this NCA. The property has a total perimeter

of 3.5 miles, of which 2.0 miles (57 percent) to the west and east are adjacent to state land. The remaining 1.5 miles (or 43 percent) of the property's border abuts private land (SWCA 1996c). Figure 2-34 shows the location of the property in relation to surrounding land ownership.

The property is not directly accessible by vehicle, but the eastern boundary can be reached by taking a four-wheel-drive, gravel road off Highway 82, east of Sonoita; driving north approximately six miles across private, state, USFS, and BLM lands; parking at the nearest point to the property in Section 23 and walking about 0.5 mile across state land. Public access is currently authorized across USFS and BLM lands but not across state and private land. Application would have to be made to the Arizona State Land Department to authorize public use of the road and state land, and permission would have to be obtained from any private landowner whose property is crossed.

No public recreational uses are authorized on this privately owned property. Potential dispersed recreational uses of the property may include, but are not limited to, hunting, hiking, mountain biking, camping, picnicking, and bird and wildlife watching. The property has not been surveyed for caves, but is in an area of known caves and has the appropriate geological conditions for cave formation. If any caves are found on the property, then recreational caving could be available. The property lies within the watershed of a segment of Cienega Creek that the BLM and the Department of the Interior have recommended for Wild and Scenic Rivers designation as "Scenic" (SWCA 1996c).

PD has let a grazing lease to this property and easements were given to the former owner for a road and water pipeline. Evidence of a rudimentary, unpassable, two-track roadway was noted during a site investigation, but the water line was not found and may not exist (SWCA 1996c). No other utilities easements, rights-of-way, or residential leases encumber this property. Phelps Dodge owns the mineral estate on 240 acres and the remaining 160 acres are federal reserve minerals. Phelps Dodge owns one surface water right for 2.0 af/yr from Mud Spring Canyon for stock watering.

No formal visual quality analysis was completed for the Clyne II property; however, some natural resource elements that define its visual quality include a low-relief canyon (Mud Spring Canyon); rock outcrops; perennial pond(s); and distinct upland, xeroriparian, and hydroriparian vegetation. Rolling hills can be seen for many miles in every direction (SWCA 1996c). No human-made structures or other indications of development exist on the property (Zenitech 1998b). Visual resource management objectives for the nearby Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most public land in the planning area will be managed for the objectives of VRM Class II.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Clyne II property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.6.2 Physical Resources. The underlying geology of the Clyne II property consists of Holocene-to-middle Pleistocene surficial deposits in the canyon floor, bounded above by sedimentary rocks, primarily of Cretaceous age, with local volcanic units (Zenitech 1998b). The potential for occurrence of mineral resources on the Clyne II property is summarized below in Table 3-45.

Table 3-45. Summary of Mineral Potential of the Clyne II Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	C

Source: D.E. Wahl 1997b

3.3.2.6.3 Biological Resources. Upland vegetation on the Clyne II property is characteristic of plains grassland in southeastern Arizona as it makes a transition to Semidesert Grassland. Most of the ground is covered with a variety of native grasses. Shrubs and succulents are widely scattered or occasionally form clusters or patches. Grass species present include blue grama, black grama, side-oats grama, tanglehead, bullgrass, bush muhly, plains bristlegrass, three-awn, and Lehmann lovegrass. Other upland species include catclaw acacia, white-thorn acacia, beargrass, mesquite, fairyduster, ocotillo, narrow-leaved yucca, Palmer agave, wait-a-minute bush, sotol, buckwheat, silk tassel, Emory oak, Mexican cliffrose, Coahuila juniper, alligator juniper, desert sumac, scrub oak, and several species of cacti including flat cream pincushion, Bisbee beehive cactus, Fendler needle hedgehog, Arizona rainbow cactus, prickly pears of two species (*Opuntia phaeacantha* and *O. macrorhiza*) and cane cholla. Mortonia, an uncommon species reaching its western-most limits in southeastern Arizona, is present in several patches on the property, and is the dominant species on the slopes above the largest pond. Drainages have a distinct xeroriparian community of mixed oaks, including Emory oak, net-leaf oak, and scrub oak, with squaw bush, sugar sumac, both juniper species, beargrass, bullgrass, and other species. Along the upper part of Mud Spring Canyon, a small hydroriparian community includes a few young Fremont cottonwoods, Goodding willows, seep-willows, and an understory of grasses and spikerushes (SWCA 1996d).

Wildlife or wildlife sign observed during a field reconnaissance included pronghorn, mule deer, blacktailed jackrabbit, coyote, raccoon, javelina, mountain lion, rock squirrel, mourning dove, canyon towhee, Chihuahuan raven, dark-eyed junco, horned lark, Gambel's quail, song sparrow, lesser goldfinch, house finch, verdin, mountain bluebird, black phoebe, eastern meadowlark, and canyon treefrog. No leopard frogs were seen, but habitat appeared suitable for leopard frogs. Small caves, crevices, and rock outcrops provide numerous shelter sites for wildlife including bats and carnivores. The Whetstone Mountains contain several caves, including Kartschner Caverns State Park on the east side and Red Cave, an important archeological site, on the west side. This property has not been adequately explored for caves, but has geological characteristics that suggest a possibility of cave formation (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Clyne II property, or for which the likelihood of occurrence is unknown, are listed in Table 3-46.

3.3.2.6.4 Cultural Resources. The Clyne II property has not been surveyed for cultural resources, and no sites have been formally recorded in the study area. During a recent reconnaissance by archaeologists, one site (and possibly more) was identified (SWCA 1996a). Flaked-lithic artifacts were widely dispersed throughout the study area. Small caves, crevices, and rock outcrops, particularly in the northern-most reaches of the property, may be conducive for use as shelter by prehistoric peoples. Over most of the property, the limestone is overlain with poorly sorted colluvium containing a variety of rock types. Many of the lithic artifacts

Table 3-46. Special Interest Species Potentially Occurring on the Clyne II Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Baird's sparrow	*Ammodrammus bairdii*	WSCA
Bartram's stonecrop	*Graptopetalum bartramii*	SS, SR
Big free-tailed bat	*Nyctinomops macrotis*	SS, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Mexican garter snake	*Thamnophis eques*	WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
San Carlos wild-buckwheat	*Eriogonum capillare*	SR
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassiz*	SS, WSCA
Townsend's big-eared bat	*Plecotus townsendii pallescens*	WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Fringed myotis	*Myotis thysanodes*	SS

Table 3-46, continued. Special Interest Species Potentially Occurring on the Clyne II Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species Unlikely to Occur		
Acuna cactus	*Echinomastus erectrocentrus acunensis*	C, HS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Bunchgrass lizard	*Sceloprous scalaris*	WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Gentry indigobush	*Dalea tentaculoides*	SS, HS
Gila chub	*Gila intermedia*	PE, WSCA
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gooddings onion	*Allium gooddingii*	CA, HS
Huachuca milk vetch	*Astragalus hypoxylus*	SS
Kearney's blue star	*Amsonia kearneyana*	E, HS
Long-legged myotis	*Myotis volans*	SS
Masked bobwhite	*Colinus virginianus*	E, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mountain plover	*Charadrius montanus*	PT
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	E, HS
Occult little brown bat	*Myotis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
San Xavier talussnail	*Sonorella macrophallus*	CA
Santa Cruz striped agave	*Agave parviflora ssp. parviflora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonoran pronghorn	*Antilocarpa americana*	E, WSCA
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	C
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, SS, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA

Table 3-46, continued. Special Interest Species Potentially Occurring on the Clyne II Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cockerell's striate disc	*Discus shemeki cockerelli*	SS
Dalhouse spleenwort	*Asplenium (Ceteracach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

observed in the study area appear to represent "testing" colluvial cobbles for material types (chert, quartzite, etc.) in an effort to find stone suitable for manufacture of stone tools (SWCA 1996a).

Considering the presence within the Clyne II property of an extensive, archaeologically significant flaked-lithic scatter, perennial water, natural rock shelters, and a wide diversity of plant and animal communities that might have been attractive to prehistoric and historic gatherers, it appears very likely that additional significant sites are present in the area (SWCA 1996a).

3.3.2.6.5 Socioeconomic Resources. This property, taxed as Agriculture/Ranch land, generated $161 in private property taxes for Pima County in 1999. Currently, a grazing lease for the property generates approximately $100/lease-year for PD (Phelps Dodge Corporation 1996).